PETROLEUM WEEK

JUNE 14, 1957

■ A McGRAW-HILL PUBLICATION

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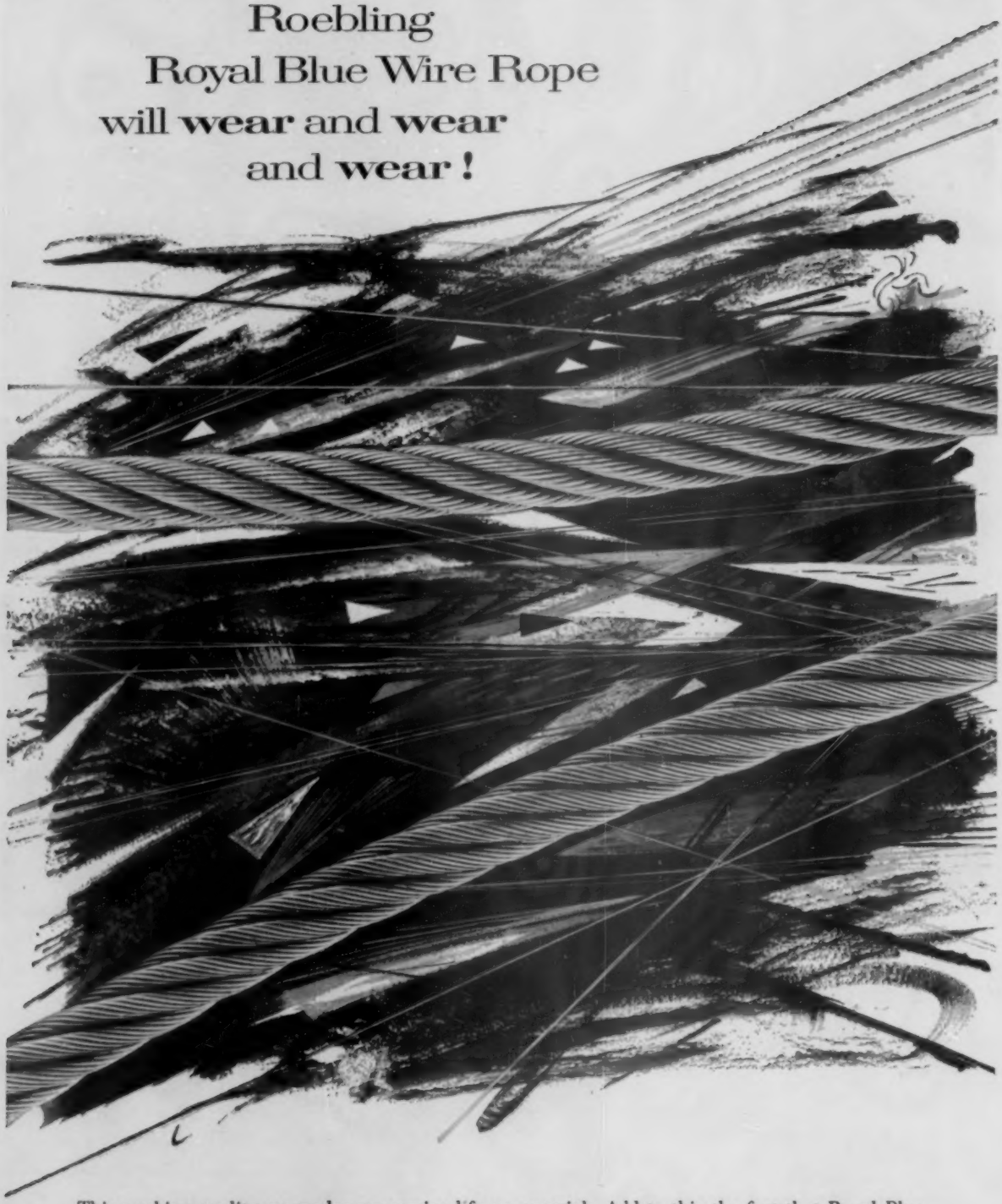

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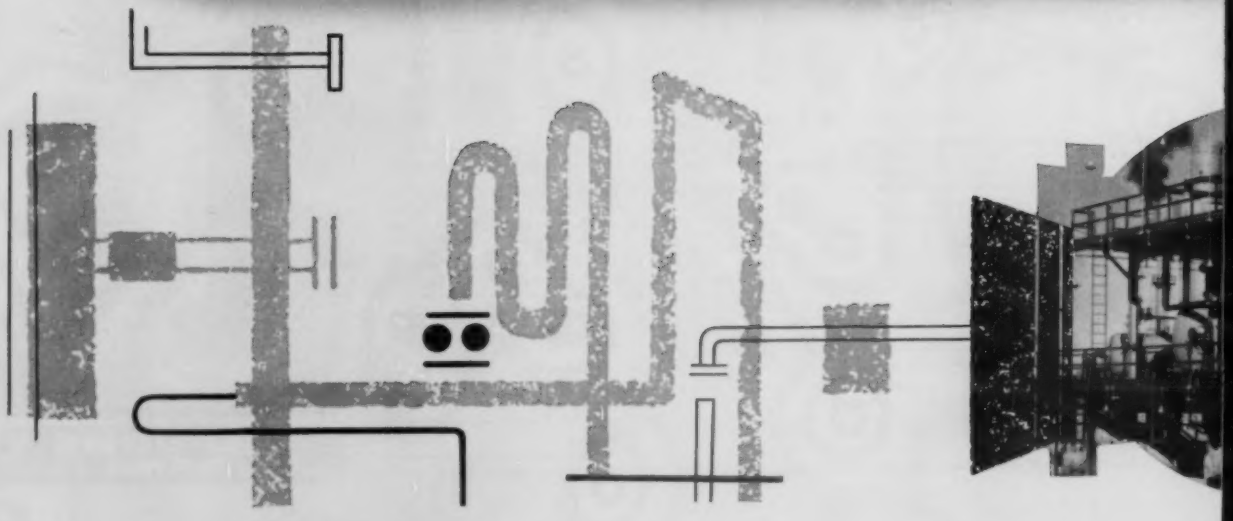

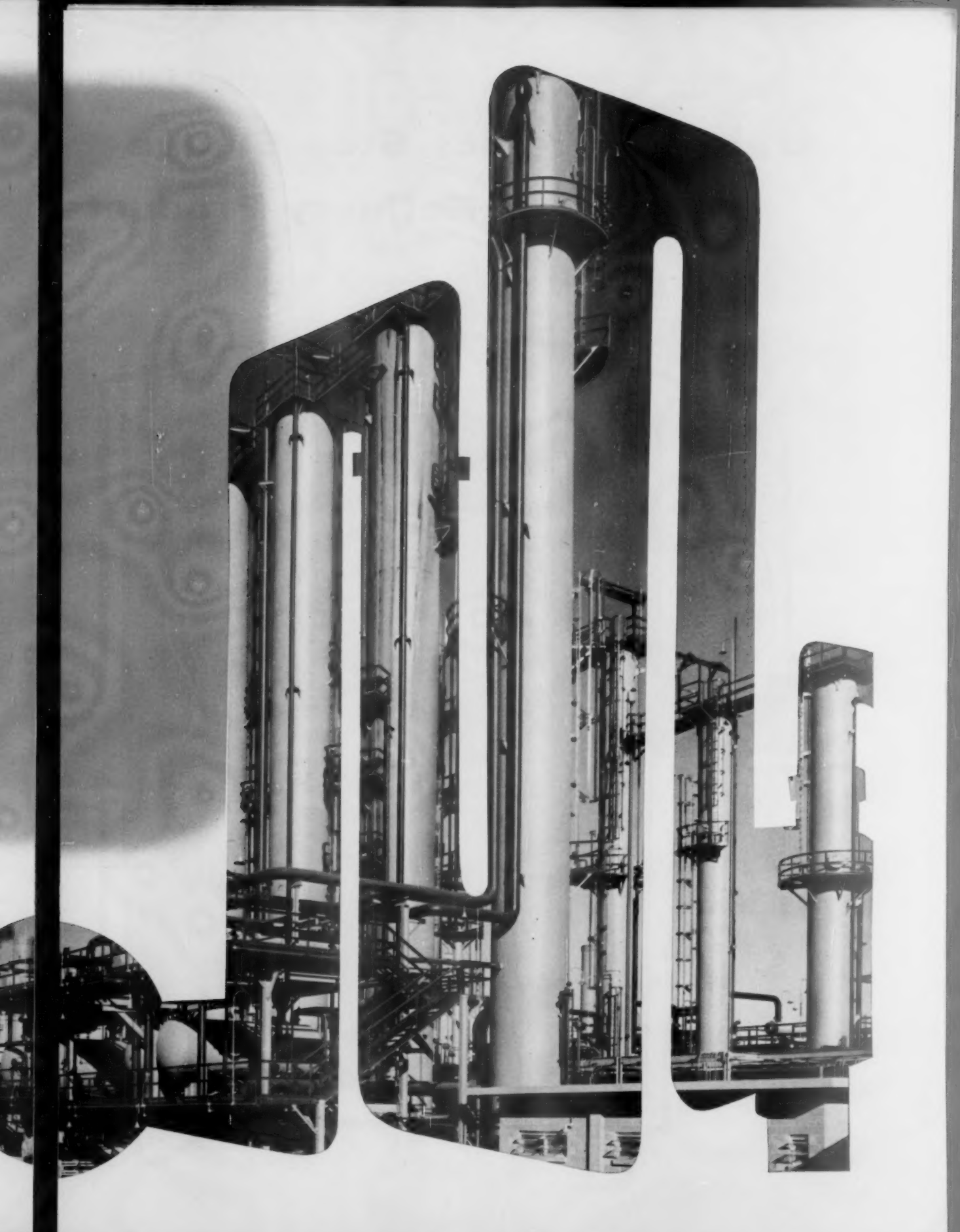

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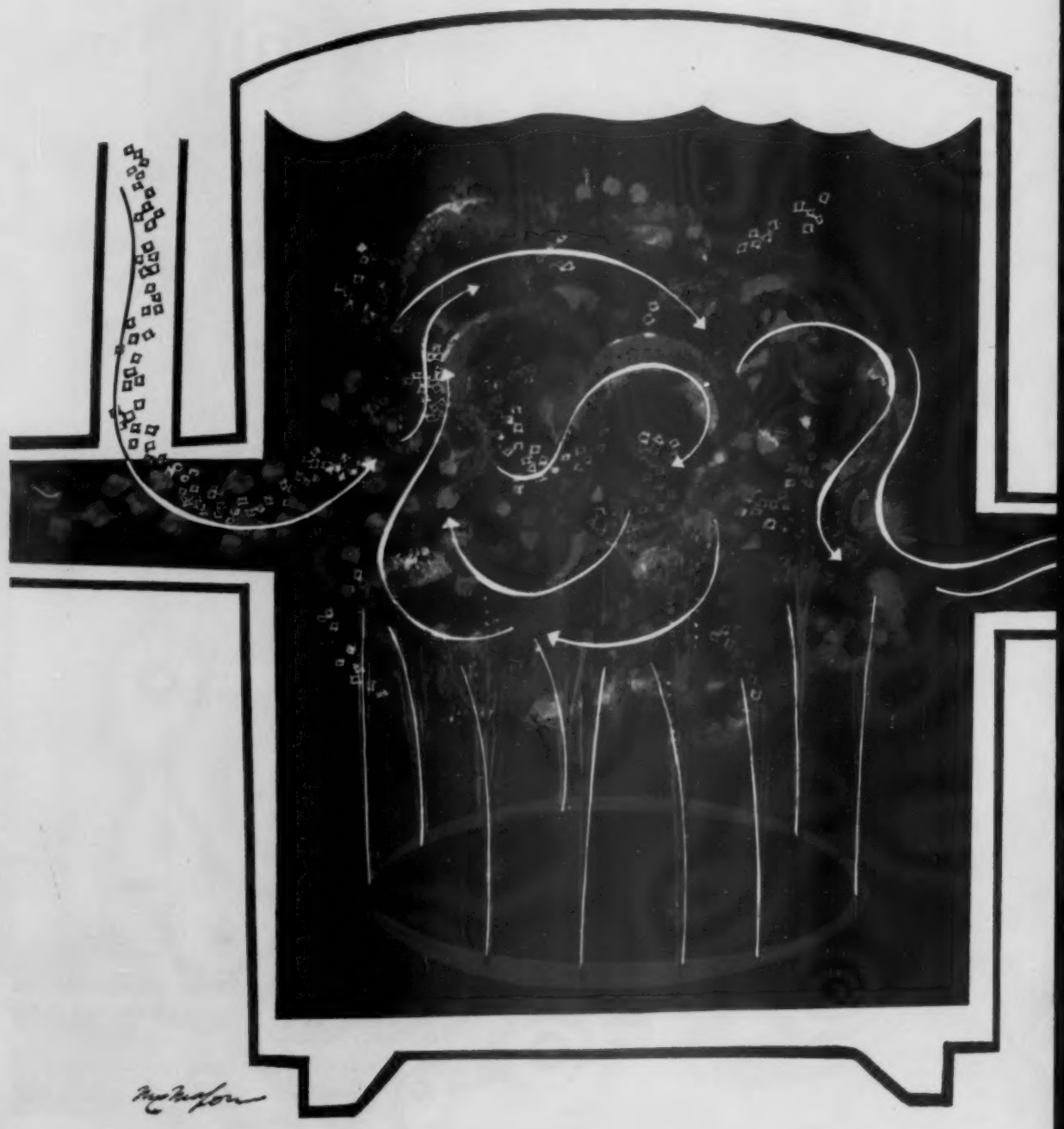

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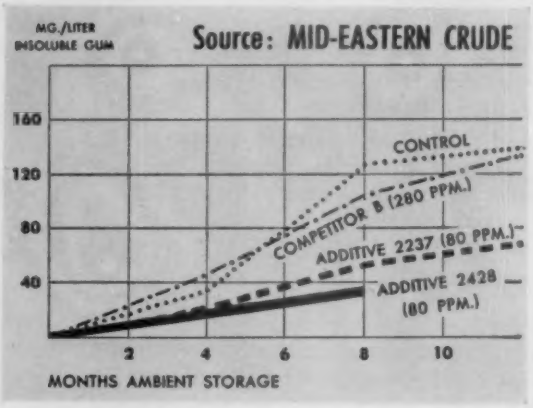

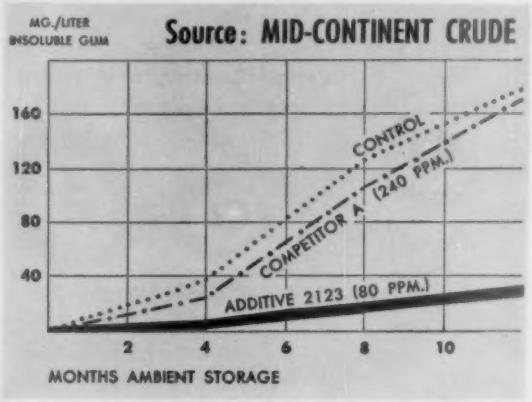

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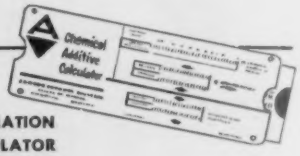

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Good Wells Make Good News

June 14, 1957

Dowell engineers can tailor acidizing to serve a variety of purposes and to give profitable results in a wide variety of formations. Here are some recent examples:

- **Harrison County, East Texas** (New Gas Well): The upper zone of a dual completion well was completed in a six-foot section of the Pettit oolitic lime at 6300 feet. Well was acidized with 500 gallons Mud Acid, 7000 gallons Dowell Retarded Acid and 7000 gallons Dowell Regular Acid. Two Allison-powered pumpers delivered acid down annulus at 2500 psi and 19 bpm. After treatment, well tested *40,000,000 cfpd open flow with 60 barrels petroleum liquids per million.*

- **Greenwood County, Kansas** (Old Well, Water Injection): Drilled in 1924 to Bartlesville sand (1847 to 1947 feet). Before acidizing, injection rate was 2 bwpd at 590 psi. Operator ran two-inch tubing and packer to protect casing. Well was treated by Dowell with 500 gallons Regular Acid followed by 50 pounds magnesium pellets suspended in 500 gallons water. 500 gallons Stabilized Acid was then injected at ¼ to ½ bpm. *Nearly one year after treatment injection rate was 287 bwpd at 505 psi.*

- **Park County, Wyoming** (New Well): Drilled into the highly soluble Phosphoria lime of the Silver Tip Pool. Open hole, 8620 to 8664 feet. Initial production—80 bopd. Analysis of sour crude indicated probable presence of iron sulfide in tubing. To prevent precipitation of iron hydroxide in formation, Dowell used Stabilized Acid. 3000 gallons were injected down 2½" tubing at 2.7 bpm and 1400 psi maximum. One week after treatment well was producing 130 bopd with no sign of plugging. *Operator considered these results unexpectedly good.*

- **Midland County, West Texas** (New Well): Completed in the Devonian dolomite 11,094 to 12,032 feet. Solubility averaged 88 per cent. Dowell pumped 40,000 gallons of Retarded Acid down casing annulus at 3800 psi. Average injection rate was 16 bpm. On test, well produced *312 bpd of 53.5 gravity oil through 18/64" choke.*

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60-Second Summary / WHAT'S HAPPENING IN OIL

AT-A-GLANCE PETROLEUM WEEK

June 14, 1957

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The gas bill faces strong opposition even with Eisenhower's revised approval. And it won't clear Congress this year. . . . p. 20

•

Refiners may improve their gasoline's "appeal" by leaving out the heavier, highly aromatic components. That's the belief of Esso Research. The heavy hydrocarbons, it says, cause increased engine deposits which boost octane requirements. . . . p. 62

•

Automatic custody transfer is being put to a new use in California. It's being used to handle viscous, low-gravity crudes that have to be heated to flow. The installation transfers about 2,200 b/d. . . . p. 26

•

Canada is certain to continue as a "hot" oil area for a long time to come. Both in production and consumption it is growing vigorously and rapidly. And an ever-increasing volume of its crude and natural gas is going to be exported to the U.S. . . . p. 41

•

U.S. crude output will be considerably lower in July—as a result of either allowable cuts or purchaser proration. And the cuts are certain to bring renewed pressure for import restrictions. . . . p. 13

•

Some independent refiners are becoming branded marketers, and competition for gasoline sales may tighten. The refiners hope to recapture shrinking markets. . . . p. 72

•

A Shell discovery in the Texas Panhandle is starting a big lease play, but there are still many skeptics. The latter concede that the strike in the Palo Duro Basin looks good, but they also recall the numerous dry holes. . . . p. 23

•

The oil industry may eventually have to resort to "common carrier" microwave bands now that frequencies are hard to get. Oil and gas companies want more, but so do common carriers. . . . p. 74

•

There are sharply conflicting views on whether proration of waterflood secondary recovery oil is harmful. And, if such production is not prorated, it cuts into allowables for primary producers. . . . p. 16

•

Employee desire for self-development is spreading through oil company ranks. Richfield's night public speaking course typifies industry efforts to capitalize on the trend. . . . p. 60

Up to the Minute / SIGNIFICANT LATE NEWS

June 14, 1957

A new attack on the oil industry was unleashed this week in Washington before the O'Mahoney investigating subcommittee. The antitrust group held hearings on a report by its staff growing out of the inquiry into the oil-for-Europe program and related problems. The report is bound to prove troublesome for the industry, whether or not it gets full approval by the subcommittee.

The Justice Dept. is urged to consider divorcement of major oil companies from oil pipelines. The staff report claims the recent U.S. Supreme Court decision in the Du Pont-General Motors case sets ample precedent for such action.

Excessive oil company influence on U.S. foreign policy is also charged. And the staff claims the proposed new Mideast pipeline is "fraught" with antitrust implications.

•

An interim legislative committee has been created in California to dig into any and all phases of the oil industry. The "fishing license" given the committee authorizes it to look into leasing, financing, discovery, development, production, conservation, transportation, refining, marketing, imports, and "the use of oil, gas, and other hydrocarbons."

•

Canada's surprising election results may have an impact on the big Midwestern U.S. gas case. The Conservatives have sharply criticized the plan under which Trans-Canada Pipe Lines, Ltd., would sell gas to Midwestern Gas Transmission Co. Observers note that an export permit has never been issued—and say it might not be by a hostile Conservative government. The outcome may not be known until Parliament meets next fall.

Generally, however, oil preparations in Canada probably will not be affected appreciably. The Conservatives may make some tax concessions favoring Canadian investors in oil and other resource industries, but foreign investments are not apt to be seriously hit.

•

Magnolia Petroleum Co. instituted pipeline proration at midweek, reducing its take and purchases of crude by 15% in Texas, Oklahoma, New Mexico, and Illinois. The company said cutbacks and strikes in some refineries supplied by it made the crude take cut necessary. The cut applies to all of June and "until further notice." Magnolia's action followed purchaser prorations made earlier by several strikebound refineries.

•

Increased efficiency—not higher margins—is the real answer to the jobber's woes, Otis Ellis said this week. Ellis, general counsel for NOJC, told his members in a Washington meeting that an oil marketing evolution is under way.

NOJC members were also told that fuel oil cannot compete with natural gas if the government restricts oil imports. Ellis said such restrictions are sure to mean higher prices for fuel oil and for gasoline.

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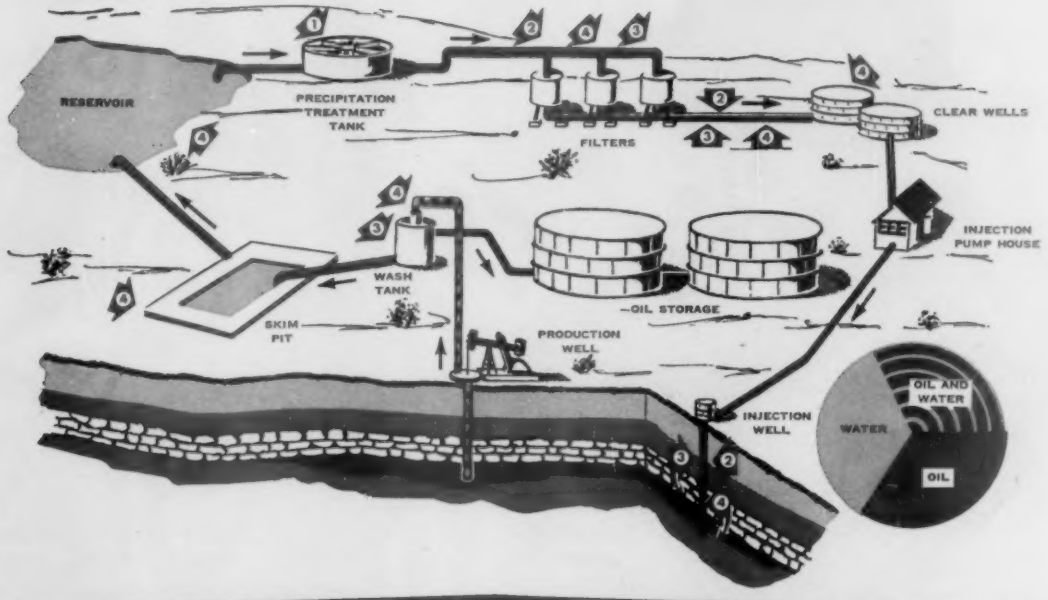

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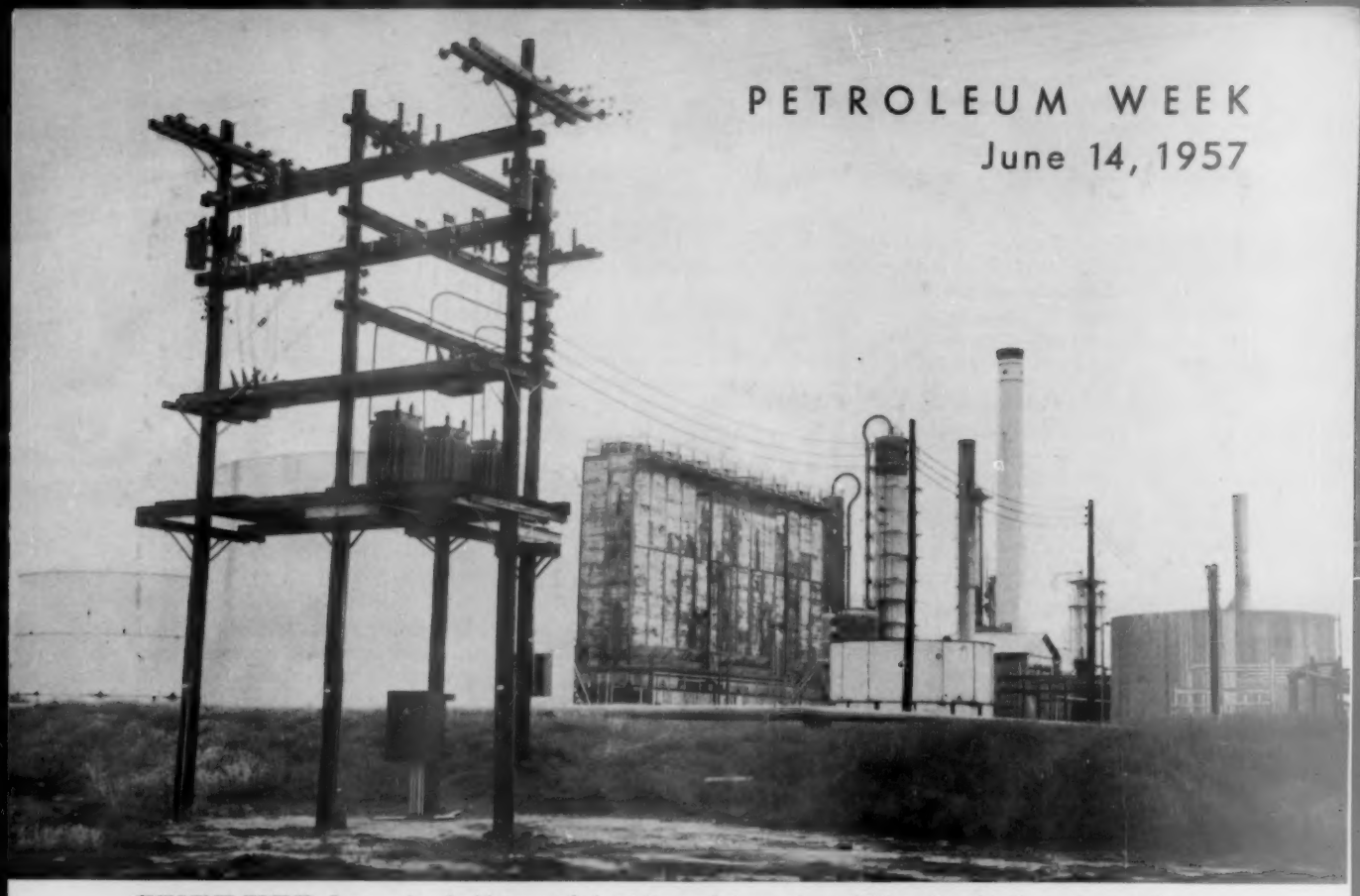


CURRENT TREND: Improved and wider uses of electricity are being made available to the oil industry. As a result . . .

Electric Firms Say: More Power to Oil

- **Use of electric power is increasing throughout virtually all segments of the oil industry.**
- **However, there are many factors to consider in deciding whether to buy the power, generate it, or use conventional engines instead of electric motors.**

Oil industry use of electric power is expanding substantially as producers, pipeliners, and refiners move more and more toward complete automation.

Optimism over this trend was evident last week among delegates to the annual convention of the Petroleum Electric Power Assn. in Amarillo, Tex.

The delegates, most of them engineers, represented the 27 electric utilities who are members of the association.

The association was organized about 30 years ago as a move by the power companies to work more closely with the oil industry on the latter's power problems.

Naturally, the organization's aim is to sell more electricity to oil companies.

Association members are scattered throughout the Midwest and the Southwest, and are also in Colorado and in Alberta, Canada.

Use of electric power by the oil industry certainly is not new. But purchased power appears to be growing more competitive with gas-engine and generated power.

IN REFINING, development of safer electrical equipment has helped increase the use of electric power.

In the past, electric equipment was not considered feasible in many oil installations where volatiles might be set afire or exploded by an electric spark.

Today, however, explosion-proof motors, switches, and other equipment permit electrification in many formerly restrictive areas.

There also has been a trend toward use of dual electrical systems to guard against power failures.

Reliability of power supply is of extreme importance in refineries, where a loss of power for only a very short period can cause interruption and damage to vital process equipment.

The dual systems begin with dual substations, and include duplicate facilities to the various process units. There are automatic selective systems at each power center, and process pumps are divided between these centers.

It is also considered desirable to have the sources of power come in from different routes, thus minimizing the danger of having both supplies knocked out of service at the same time.

IN PRODUCTION, some oil company engineers are convinced that a switch to electricity can pay off. One such switch, cited as an example, involved the use of electric motors with time clocks on stripper wells.

William A. Boosa, division engineer for Cities Service Oil Co. (Del.) told those attending the Amarillo

meeting about his firm's experience in this connection.

He said that electrification can cut operating costs of stripper leases in half.

"In the Pampa (Tex.) area," he said, "we have a gas-repressuring project. And in order to produce casinghead gas to supply our gasoline stripper plant, we had to adjust the time the wells were pumped. So, in order to get away from paying a labor premium, we decided to electrify."

Boosa pointed out that dust storms common to the area cause a good deal of wear on gas pumping engines. Electrical motors are less susceptible to dust than gas engines, and the savings on this one point alone are of importance, he said.

Cities Service first tried electrification of two leases and reported that its maintenance costs were cut about $8 per well per month.

On three other leases, containing 96 wells in the Pampa area, the company saved $7 per well per month in maintenance costs.

The power costs, by using electricity, were brought down to about 1.5¢ a bbl.

"We were able to combine pumpers in most cases," Boosa said. "About half as many pumpers were necessary to pump the same number of wells."

One benefit from the reduction of pumping units was a saving in labor costs.

IN PIPELINING, competition is fierce between electric power and gas engines at pumping stations.

Electric power is favored by many pipeliners for the remote control systems now present on pipeline systems. And pipeliners are using more purchased power for running rectifier units needed to convert alternating current to direct current, which in turn is used in various cathodic protection programs to combat corrosion.

Initial investments are lower for electrical-powered installations, but the 20-year cost of operating a fuel engine runs much less than the cost of electricity for electric motors.

C. F. Leslie, supervising engineer in the electrical and communications branch of Phillips Petroleum Co., cites this comparison:

His company, in choosing a prime mover when installing additional capacity in an existing line at an existing station, found that an engine installation would cost about $213,000. This included $80,000 for the driver, installed; $27,500 for engine accessories and piping installed; $12,500 for gear installation; $10,200 for pump installation and other expenses.

On the other hand, the electric motor installation would have cost only $103,500.

But based on a 20-year life, the total cost in operating the engine installation would be only $736,600, compared with $1,708,700 for the electric motor running at 100% capacity.

Thus, with credits for tax savings, the net savings by using an engine rather than an electric motor would —in this case—have been more than $400,000.

There are other factors to be considered in addition to initial costs and costs of fuel or power, however.

Leslie cited several advantages which might cause a company to install an electric drive in such a case:

- Reduced downtime for major overhauls. This might be offset, of course, if breakdowns occur in the power source.
- An electric motor would provide a step toward possible full electrification and remote control with a corresponding reduction of over-all manpower.

Electric utility firms are being told they can help their cause by giving consideration to special problems arising in oil's use of electricity.

For one thing, Leslie said, some power companies still do not have rates which recognize the unusually high-load factors used in electric drives for pipelines.

Also, he feels that utility companies should give consideration to annual minimum rates.

Leslie noted that there are seasonal fluctuations in pipeline deliveries, and that an annual minimum rate would be a better way of guaranteeing the power company a return on its investment.

Finally, he stressed the need for close cooperation between the oil firm and the utility supplier so that difficulties can be avoided.

Other oil firm representatives are also prodding the utility companies on the matter of rates.

Some guest speakers at the association's meeting last week said that electric rates may be too high, and that incentives may have to be offered by the utilities in order for expansion of the use of purchased power to continue.

Utility firms are confident that oil's use of purchased electrical power will continue to grow.

At the Amarillo meeting, association members told PETROLEUM WEEK that between 24% and 34% of all pumping wells in the U.S. are now electrified—using power purchased from various utility companies.

And they predicted that use of purchased power for oilfield pumping will continue upward even more rapidly in the years ahead.

They admit that electrification of various facilities have presented problems—but say that none are unsurmountable.

Petrolite Opens New Research Lab

The Petrolite Corp. dedicated a new laboratory building (above) this week in suburban St. Louis. Petrolite Research serves the five divisions of the Petrolite Corp. and four of its subsidiary companies.

Active primarily in the petroleum industry, Petrolite Research is concerned with problems involving the application and development of oil-treating chemicals, particularly demulsifiers; corrosion inhibitors and prevention; scale prevention; development of microcrystalline and synthetic waxes; and electric-field precipitation for petroleum purification and treating.

Crude Production Faces New Cuts

The choice lies between allowable cutbacks and purchaser proration. Lower refinery runs boost surplus.

Purchaser proration of crude, already started in several areas, is threatening to become widespread unless early reductions are made in allowables.

Despite the reductions made so far, crude is going into storage in volumes that are described as "alarming" by some industry sources.

U.S. crude oil inventories, which stood at 254.9-million bbl. at the end of March, rose 6.1-million bbl. during April. Another 8-million bbl. were added to the above-the-ground supply last month, boosting the June 1 inventory level to 269-million bbl., according to the latest report of the Bureau of Mines.

The seriousness of the crude oversupply will be highlighted at the Texas Railroad Commission hearing Wednesday. Some of the largest buyers are expected to request substantial cuts in the July allowable. Some may even ask for a cut for the remainder of June.

A survey by PETROLEUM WEEK this week shows that at least three of the largest buyers of Texas crude will ask the commission to limit July production to a general 13-day schedule, two less than is permitted in June.

And because of the additional calendar day in July, a 13-day schedule would mean a cut of about 380,000 b/d from the existing June allowable.

Two other major buyers are expected to join the request for a 13-day schedule; and one of the five that now plans to ask for 13 days may even nominate for only a 12-day schedule.

Eight companies are expected to ask for a 14-day schedule for next month, which would mean a cutback of about 230,000 b/d. Two of those companies, however, may request only 13 days at the hearing.

Only one company is planning now to ask for a continuation of the 15-day producing pattern for next month, which would mean a cut of about 75,000 b/d from the mid-June allowable.

Requests for a further cut in allowables for the remainder of June may be made from the floor during the hearing at Austin. While no company will commit itself, several are known to be considering the possibility.

And this week, Railroad Commissioner William J. Murray told PETROLEUM WEEK that requests for further cutbacks for June may be made.

"I feel we will be strongly urged to reduce (crude) stocks for July, and perhaps to make some reduction for the remainder of June," he said.

And with the major buyers requesting sharp cuts in the Texas allowable, producers can be expected to counter with renewed attacks on crude imports, which are expected to run at least 1-million b/d for the rest of the year.

Almost all of these major buyers are importers, either directly or through affiliated companies—so are prime targets for attack on the imports question.

These attacks surely will be heightened by the size of the cut in allowables being requested. For a 15-day producing schedule has come to be looked on as the minimum to be expected—even though the commission has never taken a public position on this matter.

The oversupply of crude, pointing to possible widespread purchaser proration, has been developing for some time. The immediate cause, however, may be reduced refinery runs.

At midweek, 260,000 b/d of refinery capacity was shut down due to strikes of locals of the Oil, Chemical & Atomic Workers union.

Standard of Ohio is the hardest-hit company, with all five of its refineries totaling 139,000 b/d of capacity struck.

The longest-running strike is at Crown Central's Pasadena (Tex.) refinery. The 35,000 b/d plant has been closed down since May 9.

Last week, Pure Oil's 48,000 b/d refinery at Lemont, Ill., joined the list of struck plants. Early this week, Socony Mobil's 38,000 b/d refinery at East St. Louis was struck.

Shortly after the strikes started in Sohio's five refineries, the company said it was ceasing all purchasing of crude oil in the 17 states where it buys.

Crown Central exercised "force majeure" clauses in its crude buying contracts as soon as it was struck.

Subsequently the Texas Railroad Commission sharply reduced the allowable in the running "W" (Waddell) field, cutting four days off the June schedule because of the Crown Central strike.

This week the commission reduced allowables in two more West Texas fields to avoid purchaser proration as a result of the Crown Central strike. The producing schedule in the Two Freds (Delaware) field in Loving County was cut from 15 days to 7. And the schedule in the Hazida (Delaware) field was reduced from 15 days to 8.

Pure, which purchases about 75,000 b/d, is understood to be effecting "force majeure" clauses in its contracts to reduce the volume of crude going to storage at Lemont.

It is anticipated, too, that Socony may have to take similar action should its East St. Louis refinery stay closed.

In addition to the 260,000 b/d of refining capacity idled by strikes, another 135,000 b/d have been trimmed from refinery operating schedules to prevent unneeded accumulation of product inventories.

The largest cutback for June was made by Esso Standard, which said its June refinery runs would "average 55,000 b/d below the rate of last June."

The list of the companies cutting back refinery runs, in addition to Esso, include Standard Oil Co. (Ind.) and its subsidiaries, Socony (and Magnolia), Cities Service, Sinclair, Continental, Sunray, Shell, and Clark Oil & Refining.

Some of the cuts will extend beyond June. Clark's reduction at its 8,000 b/d Marrero (La.) refinery amounts to "between 25% and 30%." It was made on May 15 and is expected to continue for another month or two.

While the substantial reduction in refinery runs will help to trim surplus product inventories, it means that more crude will be added to the fast-rising stocks.

One large integrated company which has not been struck and which has not announced refinery cutbacks is reported to have added 6-million bbl. of crude to its inventories in recent weeks.

The company has leased additional storage facilities to take care of its excess crude.

So far that company has not resorted to pipeline proration. It did allow one crude buying contract to terminate June 1, because of its oversupply. It was for 12,500 b/d from two Gulf Coast fields. So far the producer has not found another buyer.

And while stocks are rising, there is a considerable volume of closed-in production in several states.

In Oklahoma, for example, about 15,000 b/d of production in the Anadarko Basin is closed in for lack of buyers.

Problem: Prorate Secondary Recovery?

With allowables dropping in most states, new attention is being given to unrestricted production from waterflood secondary recovery projects. It's a touchy issue.

Whether oil production from waterflood secondary recovery operations can be prorated without harmful effects still is highly debatable.

It was debated by five experts in the field without a conclusive answer at an all-day session during this week's mid-year meeting of the Interstate Oil Compact Commission at Yellowstone Park, Wyo.

The secondary recovery and pressure maintenance committee will resume the debate at the annual meeting of the compact in Tulsa Dec. 2-4. It hopes to come up with an answer there.

Those frowning on the proration of the waterflood were in the majority at this week's session, but this was not the consensus of the committee itself. A survey reflected quite a divergence of opinion.

Secondary recovery waterflood operations now are permitted to produce at unrestricted rates in the majority of oil-producing states.

But there are some who feel that if the trend is allowed to continue in this direction, it will result in too much production being exempt from proration.

And this will throw the burden of holding allowables to market demand on wells still in their primary life of production.

Carrying the ball for proration off the waterflood was Claude R. Hocott, head of Humble Oil Refining Co.'s production research division at Houston.

Many claims of losses in oil recovery alleged to occur as a result of restriction in water injection or oil production rates are "without foundation," he said.

His opinion after study of certain waterfloods: No oil was lost in any of the operations because of reduced rates of injection or production.

He also rejected claims that in formations of variable permeability, reduction in rate of water injection results in bypassing large quantities of oil in tight sands and, conversely, that high injection rates promote high oil recovery.

His answer to this was that laboratory and theoretical evidence show that such claims violate the fundamental physical principles underlying the mechanism of flow and displacement within heterogeneous oil sand.

He said that water-set formations comprising layered and non-communicating strata of differing permeabilities would not be altered by a change in the injection pressure.

Going further, Hocott said that reduction in rate of water advance does not result in loss of oil through bypassing, but can result in a more uniform flooding, thereby increasing ultimate oil recovery.

This led to his conclusion that curtailment of oil production and water injection will not result in loss of ultimate oil recovery in secondary waterflood, and probably will enhance oil recovery.

Opposing waterflood proration, Bert Murphy, of the Waterflood Assn., Inc., of Ft. Worth, Tex., contended that the greatest recovery will be realized if there are no shutdowns or reduction in either injection or production.

He said that since the middle of the 1920s, when it was first realized that the pressure head of water upon the producing sand determined the rate at which water would enter the formation, the industry has been concerned with the effects of injection and proration practices on flood performance, particularly ultimate recovery.

Murphy said the preponderance of evidence indicates that:

- The higher the rate of injection up to formation breakdown pressure, the greater the ultimate recovery.
- If injection rates are reduced or injection is stopped, oil will be lost and will not be regained even by again increasing the rate of injection.
- Greater ultimate recovery will result from capacity pumping of producing wells where economics does not become an important factor.

In his opinion, it is presumptuous to establish a theoretical procedure and blindly adhere to it in field operations.

A. C. Simmons, of Core Testing Laboratory, Bradford, Pa., pointed out what he considers to be the ill effects of proration.

He told the compact that the first curtailment of waterflood production took place in the Bradford field in 1930 as a result of a rapid expansion in production. The proration extended from June, 1930, to July, 1933.

"As a result of this proration effort," said Simmons, "there was almost universal belief in this area among operators and company officials that the proration had produced a severely damaging effect on the total recoverable oil. Subsequent detailed analysis by engineers failed to prove this point conclusively, and it would appear questionable whether present information could add anything toward a specific proof.

"The conclusion regarding loss of ultimate recovery, reached in that period, are still held to a very general extent in this area," Simmons said.

Simmons said that while complete shutoff of waterflood is an easy mechanical manipulation, it would be disastrous from an economic point of view if a flood was of any consequence.

At the same time, Simmons declared that controlled or managed rates of waterflood oil production have been carried out very successfully in the Bradford area by scheduling water admittance to provide further production to fit specific needs.

Evidence that waterfloods can be shut down completely and then be resumed was presented by Robert B. Boffler, professor of petroleum engineering at Texas A&M College.

He cited one instance where a field was shut down for 13 months. At the end of that period, the water injection again was started, and within less than two months the production rate equalled the rate before the shutdown.

"Following this," said Boffler, "the rate continued to increase to a new peak and then declined normally. The only thing that was lost was time."

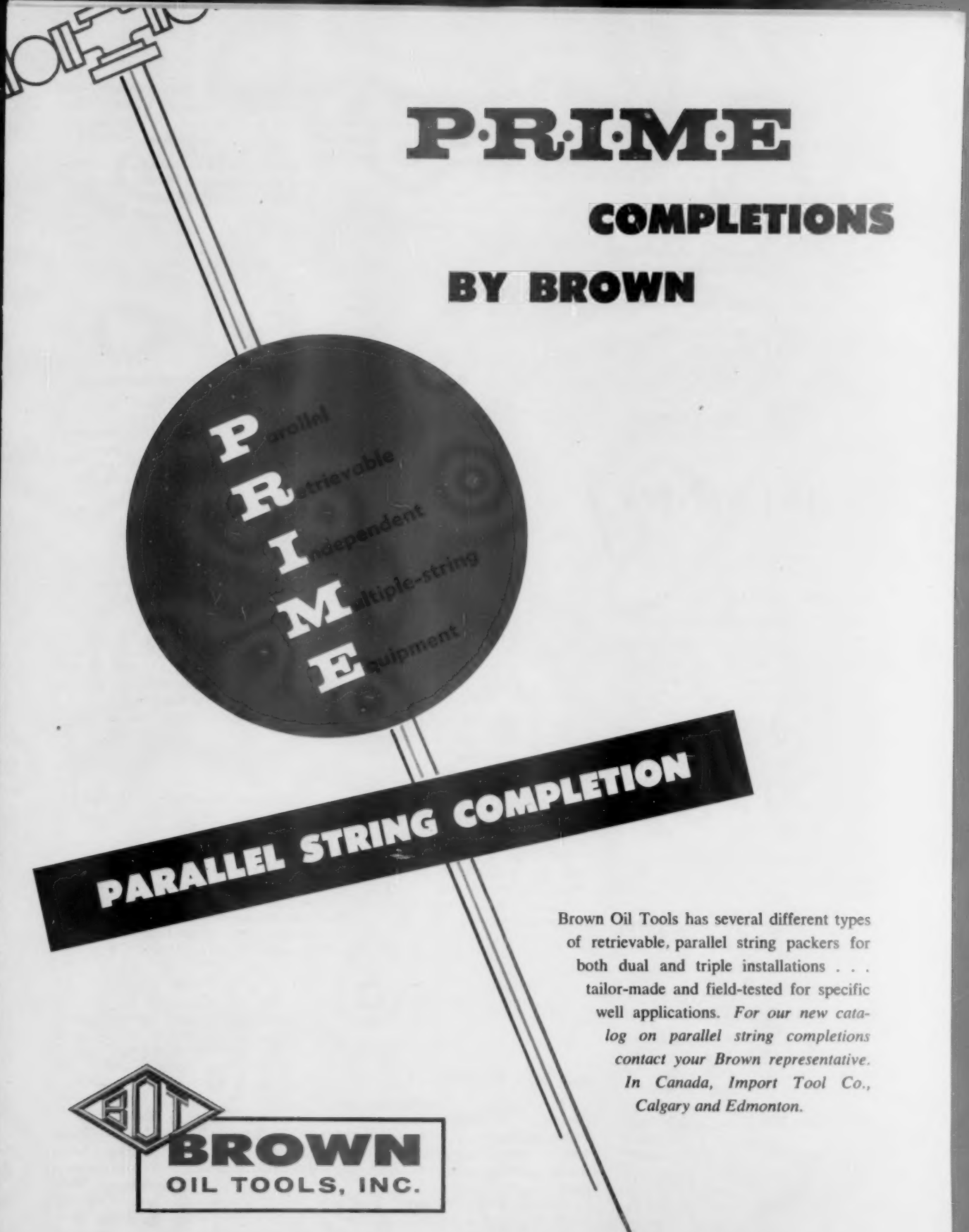
He also stated that "the shutting down of a waterflood is something that we have to face whether we like it or not."

The need for a reliable yardstick for measuring the results of waterflood projects was injected by John F. Buckwalter of Ryder-Scott Co., Wichita Falls, Tex.

It was his opinion that a good pool that can be used to compare the results of waterfloods will eventually be developed by reservoir engineers. But until this is accomplished, he said, there will continue to be many different interpretations.

He pointed out that a waterflood that appears successful to one engineer will be reported by someone else as being a failure.

"The criteria for deciding the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merits of a flood now vary from engineer to engineer, from company to company, and from situation to situation within the same company," Buckwalter said.

At the same time, he was in accord with the opinion that the greater the oil production rate, the greater the efficiency of the flood.

Opposition to proration of waterfloods was voiced by spokesmen for two associations in Texas, where a large number of such projects are located.

Bruce Street of the West Central Texas Oil & Gas Assn. said:

"This association believes that any general policy directed toward curtailment of production by arbitrarily reducing rates of injection without first considering the physical characteristics of the reservoir rocks and fluids therein to ascertain the ultimate results therefrom by the best method known to industry would be dangerous and could contribute to underground waste."

He also stated that to destroy the incentive to exploit such reserves could very well make unrecoverable many billions of barrels of potentially recoverable oil. This would not be in the best interest of conservation.

Fred Sehmann of the North Texas Oil & Gas Assn., Wichita Falls, said:

"No policy should be advocated or adopted by any regulatory body which would be directed at curtailment of production from secondary recovery waterfloods based on considerations other than the best available impartial scientific studies consistent with the goal of highest ultimate recovery from depleted fields and the consequent prevention of underground waste."

Benefits to be derived from unitization projects also were advanced.

The compact's engineering committee reported that estimates show 4.5-billion bbl. more oil will be recovered as a result of operations such as waterfloods and fluid injection under unit operations.

The committee listed a total of 404 unitized projects, from which production of oil and liquid hydrocarbons in 1956 totaled 302-million bbl. This amounted to 75% of the oil produced by all injection, pressure maintenance, and secondary recovery projects in 1956.

What's New / IN THE INDUSTRY

Automotive Turbine Competition Nears

The automotive gas turbine is "nearly ready" to compete with piston engines in some fields, three General Motors engineers said last week.

In a meeting at Atlantic City, the engineers termed gas turbines "practical and feasible" for heavy duty and military vehicles.

They said that piston engines "shade" today's gas turbine on fuel economy, but the turbine can handle additional payload at about the same horsepower.

They feel that on future highways, the gas turbine will be a strong contender as a truck power plant.

Meanwhile, in their opinion, it is likely the military will be the first to switch to the turbine.

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Domestic Crude Need Low

The market for domestic crude will be about 7-million b/d during the second half of 1957, Minor S. Jameson, Jr., predicted this week.

The assistant to the president of the Independent Petroleum Assn. of America made the forecast at a meeting of the Interstate Oil Compact Commission in Yellowstone Park, Wyo.

He said the low figure was due to the loss of abnormal exports and because of scheduled imports.

"Of greater concern," he said, "is the increasing evidence of unfavorable trends in the exploration for, and development of new sources of domestic supply to meet future requirements."

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AAODC Sees Tight Time

The drilling contractor "may continue to be in a rather tight economic position" for some time, Jack H. Abernathy, president of the American Assn. of Oilwell Drilling Contractors, cautioned this week.

But "over the long haul," the future "looks bright," Abernathy says in the current issue of the AAODC Newsletter. He analyzes the causes of the current drilling slump this way:

- Continued "excessive imports."
- Government "suspicion" of oil industry affairs.
- Instability of money and commodity markets.
- Shifting of available funds from onshore to offshore and foreign work.

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Royalty Bill Passes

The California legislature has passed a bill raising state royalty on "tidelands" oil leases to a minimum of 16⅔%, providing for a mandatory sliding scale upward for larger producers.

The bill must be signed by the governor before it becomes law.

Most of the oil industry opposed the legislation, claiming that increased royalty rates would discourage exploration.

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Bonus bids totaling $5,122,792 were made on 69,811 acres at this month's sale of oil and gas drilling rights by the Texas School Land Board.

Union Producing Co. of California was the biggest bidder, paying $897,280 for 2,500 acres in Kenedy County.

Twenty-four tracts were offered in the Gulf of Mexico "tidelands," but bids were received on only seven.

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A week-long hearing on an Air Force ban on the use of asphalt on air base runways is being planned by the House Armed Services subcommittee. Start of the hearings has been tentatively set for June 24.

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Utah's State Land Board wants to impose a 5% royalty on oil shale lands. The levy would not become effective until there is commercial production.

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The Interior Dept. probably will not hold a lease sale on offshore lands this fall. An official said there appeared to be a lack of interest by oil firms.

The department earlier had planned to offer some area outside the three-league boundary, but has gotten little response from the industry.

How Standard put $4,282,372 to work every day last year

. . . and what this meant to people in the Western Hemisphere

Port of Spain, Trinidad Exploration for possible new sources of oil covered millions of acres in the U.S., Central and S. America, Canada, Alaska and Bahama Is. Seeking oil for your future use is one of our biggest expenditures . . . $324,789 on an average day. In 1956 we found more new oil than our wells pumped from the ground.

Gulf of Mexico We completed better than two new wells a day . . . 101 off the Gulf Coast where drilling costs up to six times as much as on land. An average day's drilling bill came to $431,516. This huge sum was necessary because a well may cost from $125,000 to over $1,000,000 and one out of every six drilled was a dry hole.

Vancouver, B. C. On an average day Standard spent $517,446 to keep equipment in repair and up to date . . . extending a wharf at Vancouver or a pipe line to Boise, Idaho. This work provided employment for thousands of construction and maintenance workers as well as for the employees of the firms supplying equipment.

El Paso, Texas Purchases of crude oil took $949,853 a day in areas such as El Paso, Texas and Bakersfield, California. Although our own Western Hemisphere production was at a new high, we bought oil from many small and medium sized producers. To these people Standard was a good customer and an important source of income.

Salt Lake City, Utah Our 738 employees in Utah were among the total 38,854 who participated in benefit plans at the rate of $119,082 a day. Under our Stock Purchase Plan, Standard added nearly twice the amount an employee deposited. Other plans included sickness benefits, retirement pay and Company-paid life insurance.

Bajo Grande, Venezuela Increasing refinery output and improving products are never-ending jobs. Last year one of our operating companies completed a new asphalt refinery in Venezuela and plans were announced for a future refinery in Washington. New equipment for our manufacturing plants cost $107,741 a day.

U. S. A. Our Federal, State and other taxes amounted to $325,424 a day . . . enough to buy a helicopter for rescue work, or pay for complete training of three jet pilots every day. In 1956 Standard also collected for and passed on to Municipal, Provincial, State and Federal agencies $193,460,383 as sales and gasoline taxes.

Berkeley, Calif. Although 43.5% of Standard's owners live in the West, Alaska, and Hawaii, you'll find them almost everywhere. Stockholders include colleges, churches and banks, but most are individuals. Of every dollar we took in last year, 6-6/10¢ or $285,028 a day went to our 137,381 stockholders who own the Company.

WHAT HAPPENED TO THE $1,567,348,030 STANDARD TOOK IN LAST YEAR can best be told in terms of people . . . many people in many lands. For example, Standard was a customer of more than 10,000 Western firms last year. One major item such as a refinery unit required the services of people in scores of other industries.

Moreover, many of the 1250 products we made from petroleum were raw materials for other manufacturers . . . from paints to cosmetics, from detergents to synthetic fabrics. Thus you'd never be able to count the people who benefited directly or indirectly from the $4,282,372 Standard put to work every day last year.

Through affiliated companies operating in the Eastern Hemisphere, Standard helped carry on expansion and development programs that provided better living for people in Europe, Africa, the Middle East and the Far East. For complete, interesting details write for a copy of our Annual Report: Standard Oil Company of California, Room 2153, 225 Bush Street, San Francisco 20, California.

STANDARD OIL COMPANY OF CALIFORNIA

plans ahead to serve you better

Looking Ahead in Washington

McGraw-Hill
Washington
Bureau
June 14, 1957

The gas bill faces some tough hurdles, despite the brighter outlook. President Eisenhower gave the measure a real boost by announcing he does not insist on two amendments proposed earlier by the Administration. Chances are now about even that the House Commerce Committee will vote out the bill without the Administration proposals (1) to allow the Federal Power Commission to consider cost as one factor in setting the reasonable market price, and (2) to make existing contracts containing fixed escalation clauses subject to FPC review, the same as those with indefinite pricing clauses.

Republican leaders must give a personal push or the bill won't pass. Eisenhower's statement, alone, may get the measure out of the Commerce Committee. But the leaders of both parties—plus lobbyists from the White House—must exercise some political persuasion to get it past the vital Rules Committee and the House itself. Even then, the outcome is doubtful. House Speaker Sam Rayburn is ready to help. GOP chieftains won't pressure members from "sensitive" cities, but they're reported ready to nudge on-the-fence Republicans. The willingness of White House staffers to work for the gas bill remains to be seen.

The possibility of an ultimate veto is now discounted. Rep. Oren Harris (D., Ark.), author of the bill to protect producers against utility-type controls, says flatly he won't accept either of the earlier Administration amendment proposals. And he has no doubt that Eisenhower will sign the bill on this basis. At any rate, the measure can't reach the President's desk until next year, since the Senate won't take it up now.

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CATC is refusing to sell its offshore gas at the 17¢ rate FPC proposed recently. As a result, FPC is under pressure to grant the 21.4¢ rate originally agreed to between CATC and Tennessee Gas Transmission Co. in order to make the 3-trillion cu. ft. of reserves available to waiting customers. A rehearing was under way this week. If the rate condition is withdrawn—permitting CATC to charge 21.4¢—a precedent will be set for other producers to buck price limitations imposed on initial certificates.

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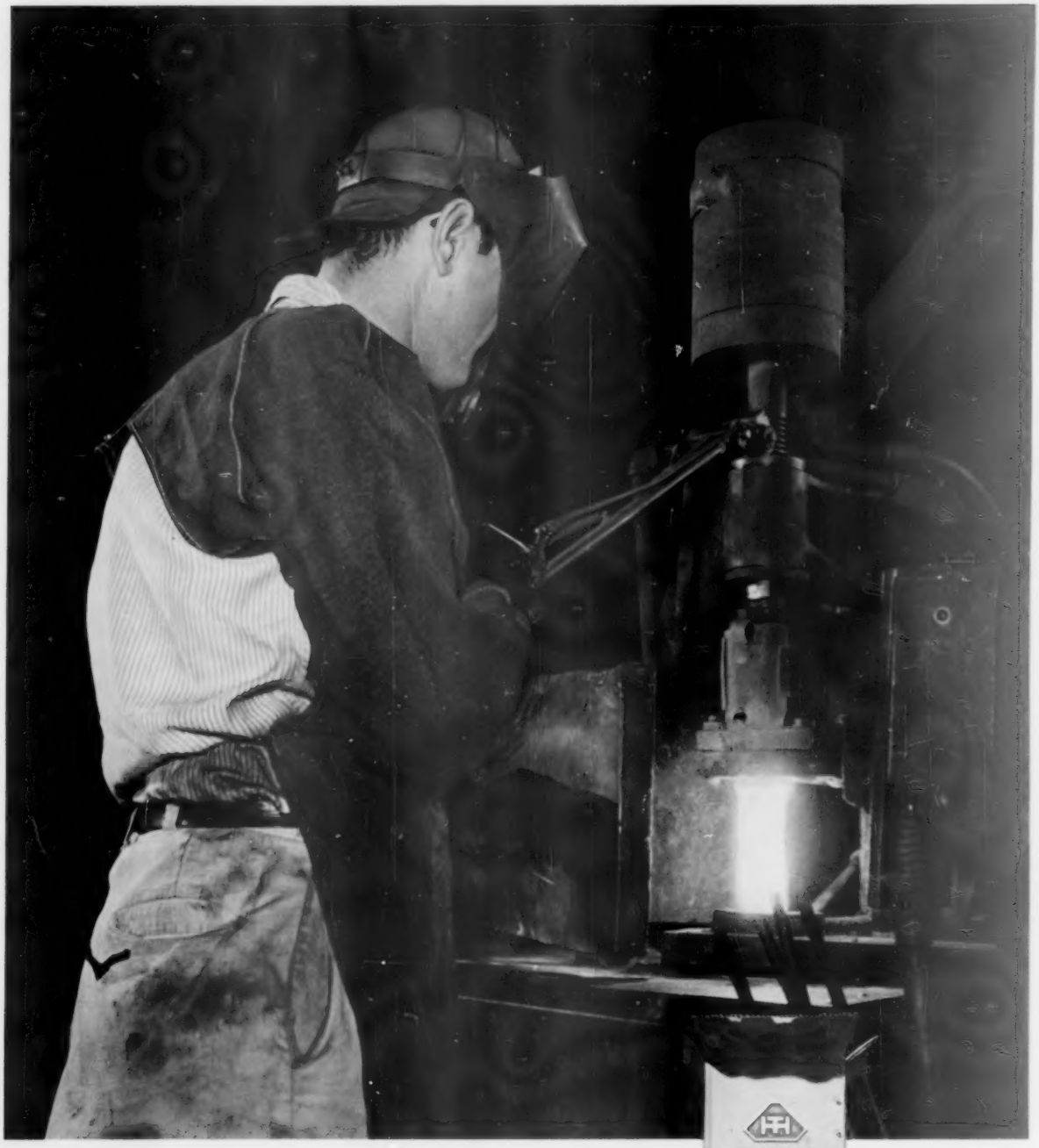
Senate investigators will look into quantity discounts on tire sales. The Federal Trade Commission lost a case in which it tried to restrict discounts given to large-quantity buyers, such as to some major oil firms. A Senate Small Business subcommittee, as a part of an inquiry into enforcement of the Robinson-Patman Act, wants to know whether this pricing practice still exists, and whether FTC is planning another attack. Obviously some senators want to try to prod FTC into new action.

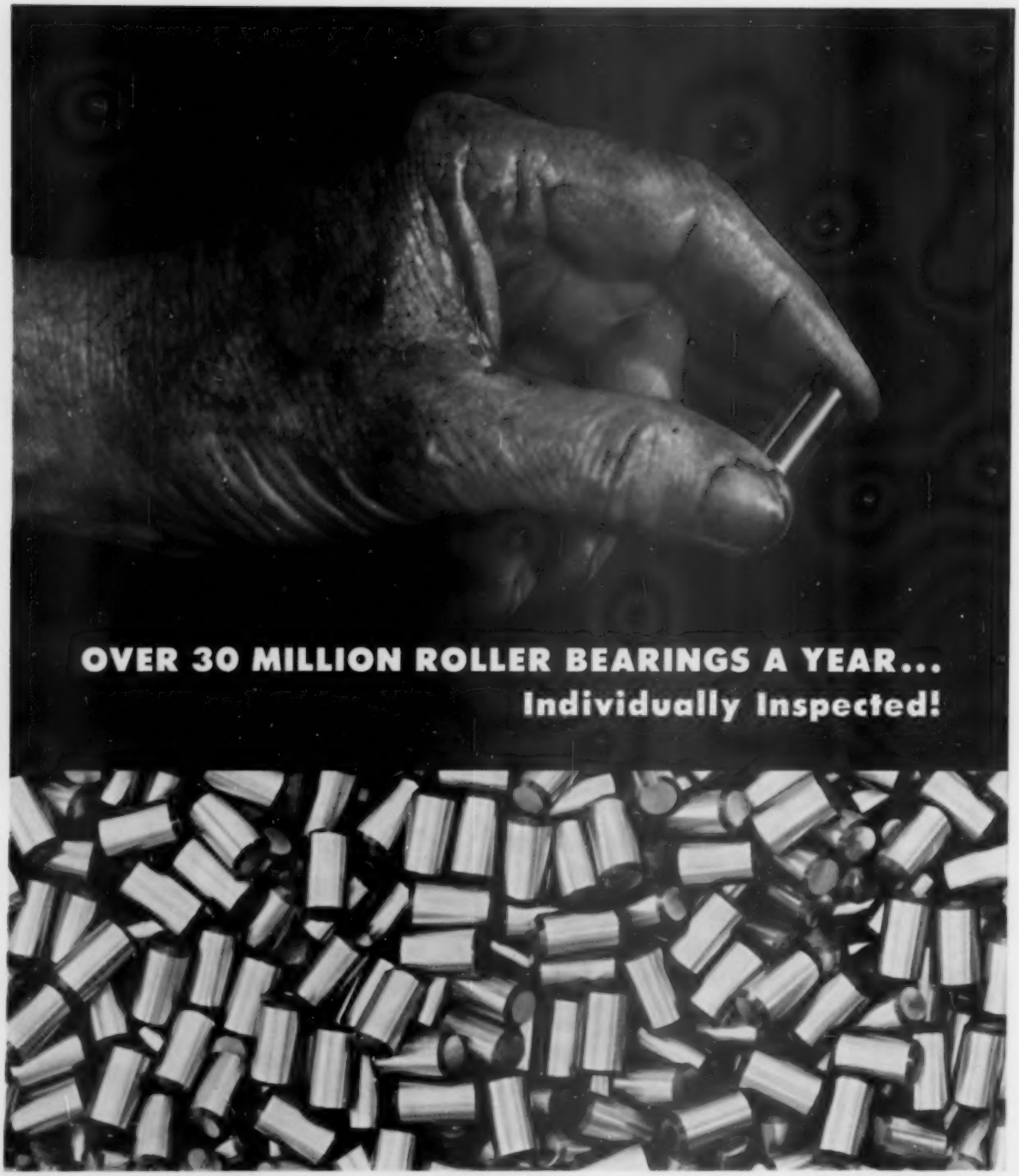
•

Chances of a voluntary solution to the imports problem look slim. Some importers have told the Office of Defense Mobilization they cannot cut back for economic reasons. ODM officials are discouraged. The Administration, although reluctant, thus may have to work out compulsory restrictions or face a 1958 revolt on Capitol Hill against its trade policies. House and Senate members from the oil country are pressing the White House for action.



making extra footage for rock bits

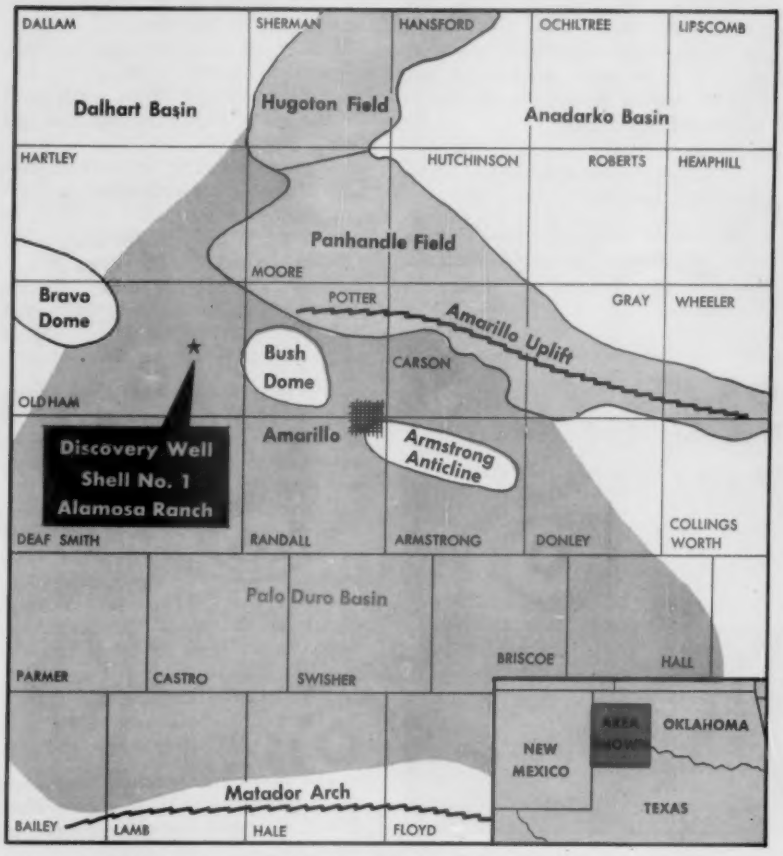
The "white hot" metal being alloyed here at over 5000° F., is molten *Hughesite* — one of the hardest known man-made materials. It is 25 times more wear-resistant than hardened steel. *Hughesite* is an exclusive Hughes development. Hughes' methods of applying *Hughesite* to bit teeth and gauge surfaces are increasing the rate of penetration and footage drilled per bit. Here is another example of HUGHES' continuing effort to provide the drilling industry with the best possible tools.



One hundred per cent inspection (not batch sampling) safeguards the quality of the roller bearings that go into Hughes rock bits. Every one of the more than 30 million roller bearings manufactured each year by Hughes goes through four final inspections.

Each bearing is inspected electronically for length, diameter and hardness, and then subjected to ultra-violet light inspection for surface imperfections not detectable by the human eye.

In addition, the special analysis bearing steel—made to Hughes' specifications—must pass a series of metallurgical inspections before it is accepted. This combination of selected raw materials and finished-product inspections assures the consistent, dependable performance of HUGHES rock bits.



SHELL'S DISCOVERY in a relatively undrilled area in North Texas explains why . . .

Palo Duro Basin Beckons

Shell Oil Co.'s oil discovery in the Palo Duro Basin of the Texas Panhandle has opened a vast new province to further exploration.

The discovery, in a remote area of eastern Oldham County, is Shell's No. 1 Alamosa Ranch, section 41, block H-3, Capitol Lands survey, 35 mi. northwest of Amarillo and 35 mi. southeast of the 1954 Dalhart Basin discovery well.

It was completed in mid-May, flowing 418 b/d of 40-gravity oil from Pennsylvanian lime at the 6,000-ft. level.

The Shell wildcat is the first producer in the Palo Duro Basin, which is the third Panhandle basin to produce in eight years and perhaps the last big hitherto unproductive Texas basin.

Some operators in that area now believe the Shell discovery may become the most important well since the 1949 Anadarko Basin discovery.

Though the Oldham County discovery touched off a play which put most of the western end of the basin under lease, it has been greeted by a remarkable degree of caution, both in word and deed.

Only two new tests have been staked in the area, both by Shell. Indications are that the region will be slow in developing.

Operators are holding back, waiting for some hardy soul to try the water first before venturing in themselves. This follows the standard pattern for the basin, which has remained an enigma since the first cable-tool wildcat was drilled in the area during the early 1900s.

In perhaps no other province has there been such a welter of conflicting opinion about oil potential.

Even in the Panhandle, which has had the giant Panhandle field in its back yard for 30 years, regional geologists have argued Palo Duro Basin pro and con, with a conviction surprising for an area where so little detailed information was available to anyone.

Some company representatives have refused even to examine basin lease submittals, terming the area "dry hole country" and regarding it much in the same light as West Texas was regarded before 1925.

Others have sworn by the basin—and at the dry holes they consistently drilled there. Prominent among the latter group are Superior Oil Co., Standard Oil Co. of Texas, and the Hunt interests.

The optimists have contended, right along, that the basin has all the earmarks of a producing area.

As they view the situation, the basin is a 32,000-sq.-mi. territory which has sediments closely akin to those found in the Permian Basin. Better yet, there is a wildcat density of less than 1 test per 150 sq. mi., which, to their way of thinking, could mean huge oil reserves awaiting only the drill bit to come and tap them.

The field has all the conditions necessary and favorable for the accumulation of oil, and the acreage has been almost dirt cheap.

The pessimists readily concede that the basin looks good. But, their simple and effective argument has run, where is the oil?

Only a few tests in the entire region have logged so much as a show. Therefore, they reason, something must be wrong somewhere.

So the argument went for years. And the basin drew its increasing number of dry holes, as if intent on proving the pessimists right.

But the dry holes also made both sides wonder, for no one could explain the phenomenon of an apparently dry basin squarely between such prolific producing areas as the Permian and Anadarko Basins.

By all the rules of oil-finding, however, the Palo Duro Basin is ready-made oil country. It's even saddled with the familiar drawbacks of inaccessibility and difficult terrain.

The basin stretches in a northwest-southeast direction across the level Panhandle and South Plains. It is intersected both by the steep-walled Palo Duro Canyon and by the Canadian River.

Actually a subsurface feature, the basin is bounded on the north by the buried granite ridge of the Amarillo Mountains and their westward continuance, the Bravo Dome (map). The New Mexico highlands define the western boundary, and the Matador Arch, a ridge similar to the Amarillo Mountains, marks the southern mar-

gin. Eastward, the basin opens into the Hollis-Hardeman Basin.

The Palo Duro Basin was formed near the beginning of the Pennsylvanian age. It is structurally complex, with sharp folding and high-angle faulting. Sediments, laid down in an embayment of the Permian-Pennsylvanian sea to the south and east, are almost identical with those in the basins around it.

Thick carbonates make up most of the Permo-Pennsylvanian strata, and also are present in the Mississippian. Silurian and Devonian are missing over most of the area, as is the Ellenburger in the central portion. Basement is overlain by a sandstone believed to be Cambrian in age.

Although these strata have been probed to the pre-Cambrian in several spots, there has been no adequate, systematic testing done over the major portion of the region.

As one veteran geologist puts it:

"They've punched the top of a few structures, and that's about all."

Interest in the basin began in 1905, when a pioneer geologist mapped three large anticlines in the western Panhandle.

The geologist was Dr. Charles N. Gould, who was working on water supply problems for the U.S. Reclamation Service at that time.

One of the three anticlines was subsequently drilled in 1918, on Gould's recommendation, to open production in the giant Panhandle oil and gas field.

Another anticline, in eastern Oldham County, was delineated in a report published by Gould in 1919. It was tested in 1928 by the old Prairie Oil Co. Ironically, the Prairie No. 1 Levinger, drilled with cable tools and abandoned at a depth of 5,645 ft., was only ½ mi. north and 450 ft. shy of what later proved to be discovery pay.

The long series of dry-hole years was ended by the work of the Shell exploration team which turned its attention to eastern Oldham County last year.

Proving out Gould's surface geology, Shell blocked more than 100,000 acres of the area east of the structure, then took a 10,000-acre checkerboard farmout from Hunt Oil Co. on the Alamosa Ranch to the west. Seismic surveys were run on both the Shell and the Hunt blocks.

When the seismic picture showed the structure continuing down into the section, a test well was justified.

The Shell effort reached its successful climax on Mar. 29, this year, when No. 1 Alamosa Ranch recovered oil on a test.

A one-hour drillstem test from 6,096-130 ft. in Pennsylvanian lime recovered 4,000 ft. of oil and 500 ft. of heavily oil-cut mud. After coring and drilling ahead of 6,722 ft. in granite, production crews plugged back and completed through perforations at 6,098-120 ft. for a flow of 418 b/d.

Flow was through 1-in. choke, with production coming from the Virgil limestone series. No water has been found.

What happens now is the big question.

Superior, Hunt, and Standard of Texas all have large holdings in this end of the basin, along with Amerada and Humble.

Shell, in addition to its large block, stands to gain 20,000 acres more from Hunt by drilling two more wildcats on farmout acreage.

At late reports, Shell was preparing to commence drilling operations at a pair of tests on its own leases—one a southeast offset to the discovery, the other 15 mi. to the east.

Only the future can tell whether the basin will be all that the optimists claim. Whatever the result may be, interest is at a new high.

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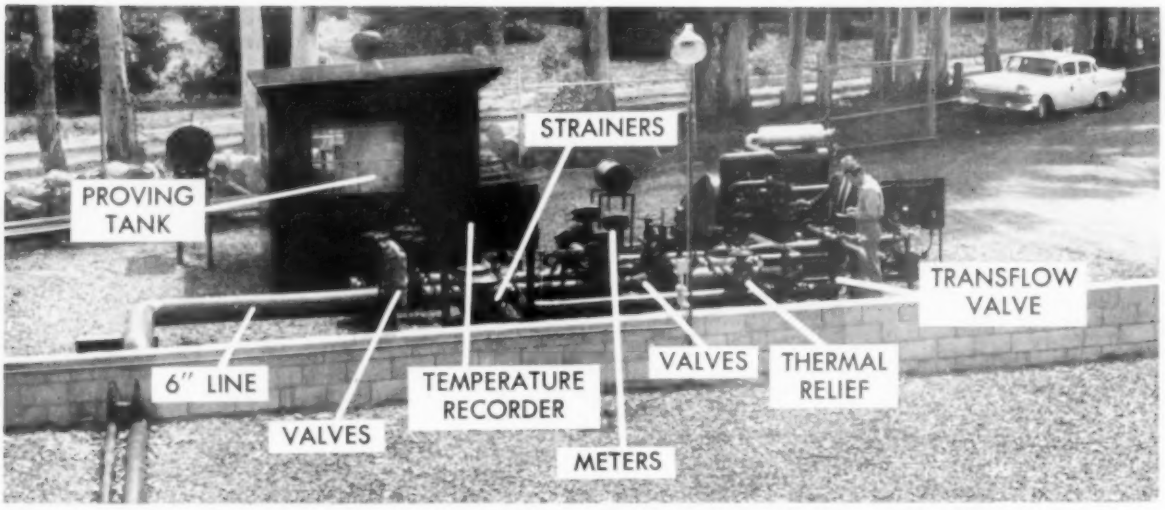


AUTOMATIC CUSTODY TRANSFER of heavy crude is achieved by this Union Oil Co. of California system at Yorba Linda field as . . .

ACT Is Put to New Use In California

Automatic custody transfer is being used in a new way by Union Oil Co. of California. The new use involves automatic transfer of viscous, low-gravity crude, which is heated in the process. Up to now, only lighter crudes have been transferred through an ACT installation, because of their better flow properties.

The unit is located in the Yorba Linda field, Orange and Los Angeles Counties, where Union initiated the operation last October in purchasing crude from Western Gulf Oil Co.

The ACT installation, costing approximately $15,000, is located beside a Western Gulf tank battery consisting of three 2,000-bbl. shipping tanks and a larger wash tank.

It is neat and compact, taking up a space of about 20 ft. by 30 ft., and is painted a dark "avocado green" to blend with surrounding avocado and citrus groves. Present capacity could be doubled by installation of another pump adjacent to the existing unit.

At present about 2,200 b/d of heated, low-gravity crude move through the ACT installation.

Crude moves from Western Gulf's tanks through a 6-in. line to the ACT unit. There it passes through a strainer in which 20-mesh screens filter out excessive sediment.

From the strainer, oil goes through a positive displacement meter equipped with a printer. A meter counter, which can be read to 1/10 of a gallon, records the amount of fluid passing through it.

Crude is handled by a 4x6-in. reciprocating pump, capable of delivering pressures up to 1,000 psi., into Union's 6-in. line. The pump is operated by a gas engine.

Automatic metering facilities are duplicated in the installation, which was designed to handle both 12-gravity and 15-gravity crudes.

At present the two crudes are blended in the field by Western Gulf and then delivered to Union. Handling the blend gives Union a certain amount of flexibility in its operation. The company can operate through one meter, keeping the other in reserve.

Meters are "proved" every other week by a gravimetric-type proving system, rather than the volumetric system usually employed.

In essence, meters are proved by diverting crude into a 500-gal. proving tank, then depressing an outside control button to record readings on two tickets—one recording the weight of the proving tank, the other the reading from the positive displacement meter.

After about 250 gal. of crude have been diverted into the tank, the outside control button is depressed again, giving two more readings on the same tickets. Line temperature is taken as a means of determining the volumetric correction for meter volume.

A chainomatic-type balance is used to determine the specific gravity of the oil, which is necessary to convert the weight of oil run into the proving tank into gallons. The resulting figure in gallons is compared with the amount that passed through the positive displacement meter as a check of the meter's accuracy.

Automatically procured, continuous proportional line samples are taken weekly to determine the quality of the crude.

Temperature of the crude in the installation is maintained between 140F and 160F.

This is accomplished by circulating hot water through tracer lines around the pipe, and also by insulating both the ACT installation and the shipping tanks.

Thermal relief valves have been incorporated into the ACT installation between meters and pumps as a safeguard against rupturing from thermal expansion.

Automation is even used on the engine that powers the pump; it has an automatic oil-level controller and an exhaust condenser to provide water for its radiator.

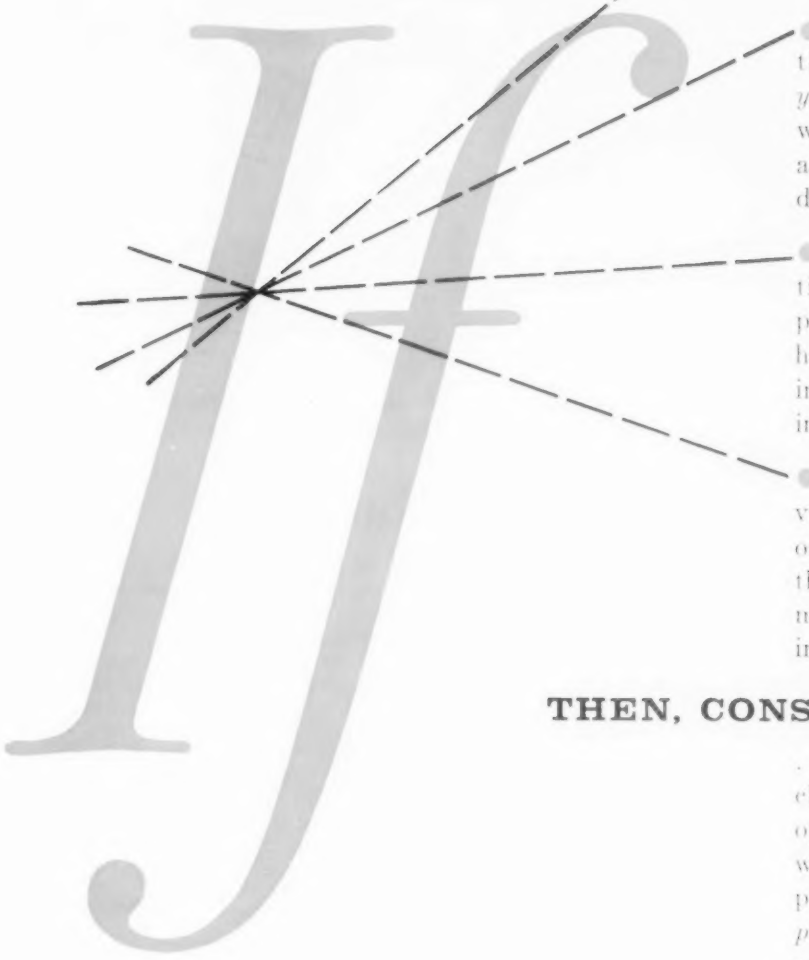
The installation has proved "very satisfactory," according to a Union spokesman, with savings for both Union and Western Gulf.

Main saving for Union is in labor, primarily in time saved for the company's gauger.

By the continuous operation, Western Gulf saves in the amount of storage required for its crude.

Continuous operation provided by the ACT installation is also a deterrent to pipeline problems, because it keeps the viscous, heavy crude constantly moving.

Representatives of many companies have shown interest in the installation. "Judging from the visitors we've had," says a Union official, "you'll probably see a lot of these installations making their appearance out here."



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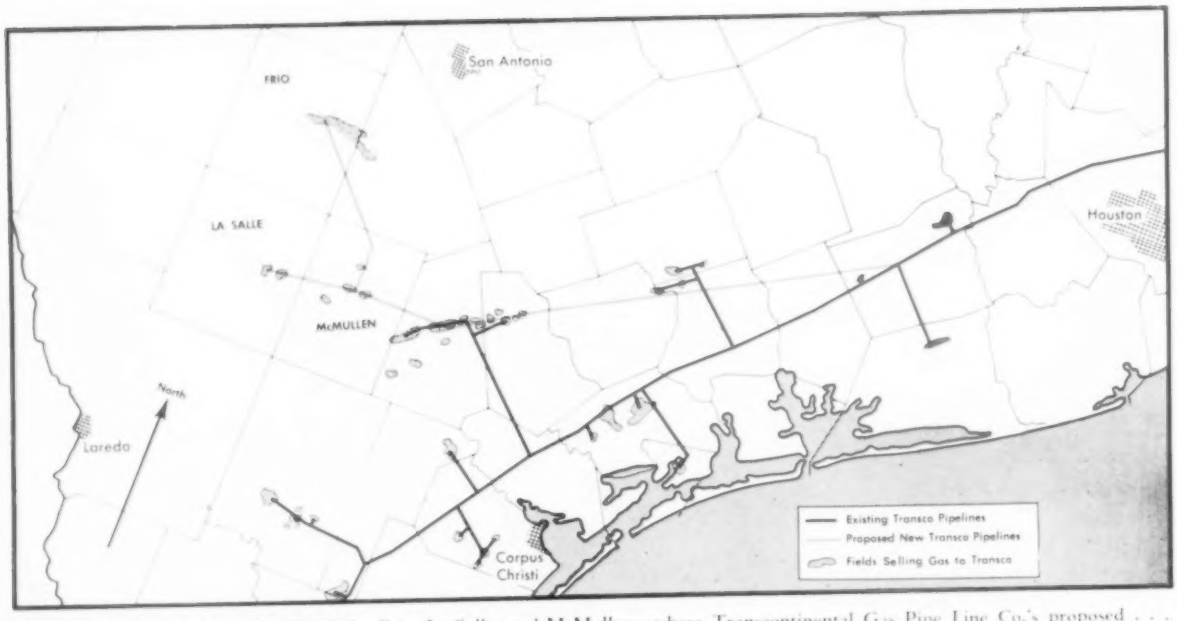

THREE SOUTH TEXAS COUNTIES—Frio, La Salle, and McMullen—where Transcontinental Gas Pipe Line Co.'s proposed . . .

Pipeline Will Spark New Gas Play

A Federal Power Commission decision apparently holds the key to a new drilling play for Edwards formation gas in three South Texas counties, which Transcontinental Gas Pipe Line Co. wants to tap for new supplies.

FPC held hearings on May 27 and again on June 10 on Transco's plan to build a 229-mi. line into Frio, La Salle, and McMullen Counties. The lateral would join Transco's main line near El Campo, Wharton County (map).

Neither Frio nor LaSalle have any major transmission company connections now, and only a relatively minor amount of gas is being collected in McMullen.

Several operators with shut-in wells are eager to develop the indicated reserves and have signed contracts with Transco.

Drilling is lagging right now, with operators waiting on the FPC decision. If it's favorable, there'll be a big jump in activity.

The overall expansion program calls for the installation of about 200 mi. of main gathering system pipelines of varying sizes and 250 mi. of 26- or 30-in. pipe in the transmission line from Southwest Texas to the Houston area.

Only opposition to the plan so far has come from some coal interests. No cross-examination has been held yet, so a decision is some time away.

Among those awaiting the decision is Lee Bros. Oil Co., of Houston. This company, which holds a 50% interest on one shut-in well with Pan American Petroleum Corp., probably would drill as many as 8 wells (on a 320-acre spacing pattern) or 4 wells (on 640 acres) in the 2,700-acre tract involved—if it had an outlet.

"Having the gas is no good if you can't sell it," says Donald Lee. He adds that Lee Bros. will do some drilling in the next two years, regardless, to hold leases.

One major company, with 4 wells scattered through the area and a 50% interest in two others, says it is waiting on the production results of these wildcats before "formulating additional plans for drilling next year."

An official comments, "The reason we're not going at a faster pace is the lack of a pipeline."

Another independent, with two shut-in wells, says, "We're not going to go in there and spend a lot of money drilling wells that we have to shut in. We have started a study of reservoir conditions and other factors, however, to see what we want to do if conditions warrant it. We have 15,000 acres leased and we'd like to see a market."

Transco's efforts to sign up the new supplies has barely scratched the surface so far.

Here are the areas and operators involved in the current Transco contracts:

- Frio County: West Big Foot, Frio-Tex Oil & Gas Co.
- La Salle County: White Kitchen, Lee Bros. Oil Co.; Washburn Ranch, Quintana Petroleum Co.
- McMullen County: Craig, Amerada Petroleum Corp.; Dilworth, Texam Oil Corp., Longhorn Drilling Co., and others; Henry, Standard Oil Co. of Texas and Amerada; South Tilden, Standard of Texas, Texam, Longhorn, Amerada, and others.

This list of operators actually just scratches the surface of those active in the three-county region. For one thing, uncertainty over federal control makes some operators with large shut-in holdings reluctant.

For another, Transco hasn't yet launched a full-fledged drive to sign up all possible supplies. If FCP approves the application, that drive will develop.

The Transco contracts call for 14¢ per Mcf in McMullen and 15½¢ per Mcf in La Salle and Frio.

The lack of full development and of adequate production histories makes reserve estimates very difficult.

Fields haven't been defined by drilling. The pattern has been to drill one or two wildcats on a prospect and then shut them in.

Outside of some gas sales for rig fuel, none of the wells have been produced.

One major company estimates that the wells on the east-west trend through McMullen and La Salle probably will potential at about 15-million cu. ft. per day, while those on the trend northeast from McMullen prob-

ably will potential from 50-million cu. ft. per day up.

Even so, the wells could behave differently on production. They might produce at a higher, or lower, sustained rate.

George W. Delker, executive vice-president of Texam, says it is the company's experience, from producing formation fuel, that it takes from 60 to 90 days for an Edwards well to hit a peak.

In its application, Transco estimated that proven wet gas reserves already committed total an estimated 286-billion cu. ft., of which an estimated 211-billion cu. ft. could be recovered.

These figures cover only the actual proved acreage of the producers who have already signed contracts, and very little of even their acreage has been drilled.

Some operators believe eventual proven reserves will be very high.

One gas company top official recently described the possible reserves as "one of the biggest" find prospects now in sight.

Others, such as Delker, consider the area "blue-chip country."

"There's 1,200 ft. of thickness in the Edwards," he points out, "and we think 1,000 ft. of porosity. It's possible that the reserves might total in the trillions of cu. ft." He notes that the lower portions of the formation haven't yet been drilled.

"If the line comes in, the play really is going to be something," he says.

Not all of the reserves sought by Transco are in the Edwards.

Trio-Tex, which holds at least 95% of the acreage in West Big Foot gas field, now has completed 15 wells in the Olmos sand, at an average depth of about 5,000 ft. Seven of these wells are included in the Transco contract.

Curtis Fisher, Trio-Tex president, says the company expects to complete 50 to 55 additional Olmos wells during 1957. He says drilling already has established that the field is 2½ mi. to 3 mi. wide (north to south) and about 14 mi. long (east to west).

All told, Fisher says, the company probably will sink 45 to 50 Olmos wells. But, he adds, it also plans to test the Edwards.

Generally, the Edwards is found at about 11,500 ft. along the trend. Because of a steep regional dip to the east, however, the depth varies considerably, and some Edwards wells have been completed just below 10,000 ft.

The formation is a fractured lime, presenting tremendous variations in productivity.

If it receives the FPC go-ahead, Transco hopes to begin construction of its line this summer.

Canada uncorks its gas resources

For Canada's vast, almost untouched supply of natural gas, outlets have already been planned to deliver over 10 trillion cubic feet to North American markets. Canadian gas reserves are expected by 1970 to approach 55 trillion cubic feet.

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The Canadian Bank of Commerce maintains a complete Petroleum and Natural Gas Department in Calgary, and more than 270 branches throughout Western Canada. For information on any aspect of the industry in Canada, write or telegraph to C. H. Munro, Manager, Petroleum and Natural Gas Department, 509 Eighth Avenue, West, Calgary, Alberta.

(We regret that we cannot advise on the merits of oil or mining securities.)

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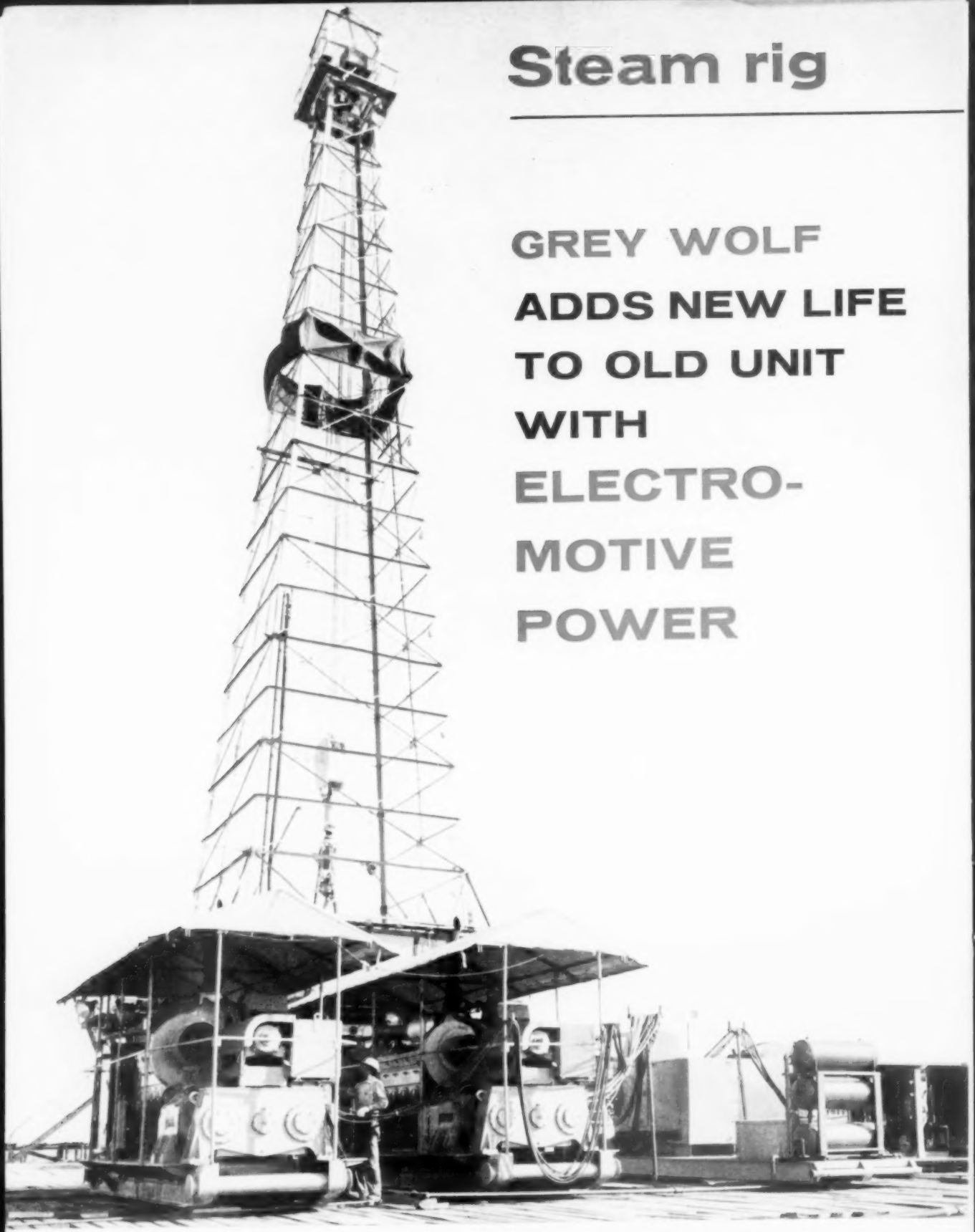

Two skid-mounted Electro-Motive 875-hp generating sets power Grey Wolf's recently converted rig. Each 8-cylinder engine drives two 500-kw dc generators that supply power to electric drive motors on draw works, rotary and mud pumps. Electrical control cabinet is located on skid to right of engines.

converted to Diesel-Electric

Grey Wolf Drilling Company of Houston expects its newly converted Diesel-Electric rig will cut rig-up time to three days—just half the time it took with the old steam unit.

In addition, "trips" are faster with the new rig and drilling speeds were judged faster on two locations where depths up to 13,000 feet were reached. Maximum drilling depth is well beyond 17,000 feet.

Why Diesel-Electric?

Grey Wolf saw two distinct advantages: Diesel-Electric would adapt readily to present components, thus reduce costs; and because components are connected by flexible electric cables, the rig could be broken into skid-mounted packages for fast transport and quick rig-up.

Why Electro-Motive Power?

A "packaged" system was one reason Grey Wolf decided on Electro-Motive Power. For this system is designed and built to work together—one manufacturer—one source of responsibility. Other reasons were the accurate control and torque characteristics of Electro-Motive Power plus its demonstrated economies of long life and low maintenance on both land and offshore rigs.

Have you considered the advantages of Diesel-Electric for your drilling operations? Contact your Electro-Motive Representative for complete details.

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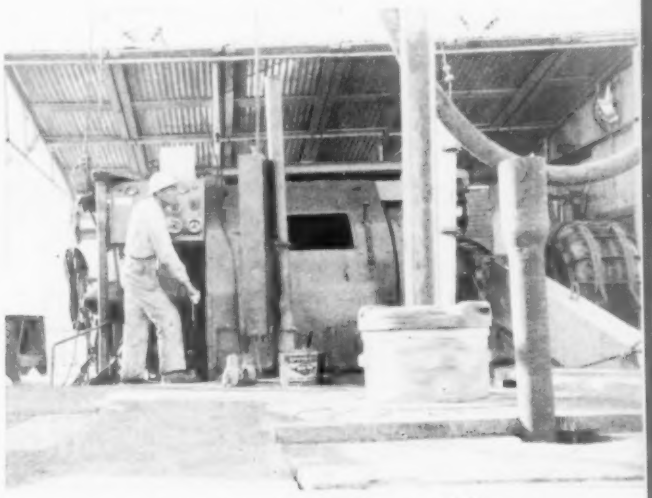
View from derrick floor shows simple arrangement of components on ground. Single 625-hp dc electric motors drive mud pumps. Electric cables run from generating units to various motors on overhead runways. Flexible cables permit placing equipment to fit location conditions.



Driller's control stand provides maximum visibility for every operation. Simple, sensitive controls provide smooth and rapid acceleration of loads with positive control of speed and torque. From this one panel, driller has complete control of all Diesel-Electric equipment.

Albertans Split on Proration

A sharp fight is going on in Alberta between majors and independents for a larger slice of the market pie.

The struggle came to light at an open hearing held by the Alberta Petroleum & Natural Gas Conservation Board late in May.

Major companies want drastic changes made in the present method of prorating the production allowable to market demand. The independents are solidly in favor of leaving the present formula as it is.

At the hearing, the majors said that Alberta's economic allowable should be set up to encourage development of fields with a high productive capacity. Independents objected, saying that a change in the present system would make lower-capacity wells unprofitable. On the whole, the more-prolific wells are owned by majors, the smaller producers by independents.

The economic allowable, as it is now set up, gives each well a guaranteed minimum production rate, starting at 50 b/d per well, and increasing as well depth increases.

Above this figure, the market pie, which is only 50% of the province's productive capacity, is split among wells that have a greater capacity to produce.

One major at the hearing said that 60% of the present market of about 425,000 b/d for Alberta crude is now supplied through economic allowances and unprorated pools. The remaining 40%, or 172,000 b/d, is allocated on the basis of MPR.

Since the total MPR of proratable pools is approximately 690,000 b/d, the so-called proration factor is 0.25, this major said. This means, the major continued that the effectiveness of the MPR in allocation of production is only 25%.

This major claimed that wells with MPR's up to 55 b/d have an allowable equal to their MPR's, whereas pools with a high MPR have allowable as low as ⅓ their MPR.

The majors propose that:

- The economic allowable be replaced with a flat rate "floor allowance" of 20 b/d on all wells. After this amount has been produced, wells with a capacity higher than 20 b/d would be prorated to the balance of the market demand.
- Economic allowables of shallow wells be reduced and those of deeper wells be increased, on the ground that an operator would be encouraged to meet the higher cost of deep well development if he could sell more oil.
- Allowables be based on average cost of well development for a field, taking into account not only well depth but also the gravity and price of crude being produced, and production costs.

Independents object to these proposals, saying that any changes will result in a lessening of activity by small companies. Independents base much of their financing on the minimum rates of production guaranteed by the economic allowables.

The Alberta struggle is being watched closely in Saskatchewan and Manitoba, where there are no economic allowables.

The lack of allowables—beyond those dictated by good conservation practice—has had a particularly noticeable effect in Saskatchewan in maintaining high cash bonus bids on choice acreage where proven and semiproven land has been up for lease. In Alberta, the allowable has evened out bidding by bringing good prices on acreage in a low-productive area.

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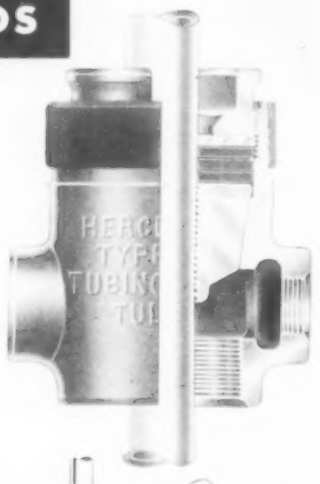
Ideal for flowing or pumping wells or for well servicing and repressuring projects. Will suspend 2" tubing to 5½" casing up to maximum of 180,000 pounds. Head is full-opening, constructed of pressure cast steel tested to over 4,000 psi. HERCULES original overhead packing arrangement and hinged slips facilitate installation and servicing. HERCULES Neoprene Tubing Stripper (2"-2½"-3") may be used in this head on wells flowing intermittently or to wipe tubing. Equipped with safety threads.

"TYPE J-5-S" STRIPPER TUBING HEAD

The dual purpose "Type J-5-S" Stripper Tubing Head is basically a "Type J-5" Tubing Head with a bowl (top section) screwed into the packing nut thread. The hinged slips, packing and packing nut are installed in the bowl (top section) with the tubing stripper in the body (lower section), thus permitting tubing to be run-in or removed under pressure. Test pressure is the same as the "Type J-5" Tubing Head.



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Multi-Perforating Gun is Developed

A new method of jet perforating, which can tap several isolated zones with one run into the hole, has been introduced by the Western Co. of Midland, Tex.

The new technique consists of selectively firing a series of jet guns on one run into the bore hole.

The tool, called the "Selective Rocket Jet," is designed to provide savings in rig and personnel time, while gaining in accuracy and performance, according to H. E. Chiles, Jr., president. The tool was developed by Western's research and development division.

The "Rocket Jet" permits a number of jet gun sections of various lengths to be connected, and fired individually at the desired perforating zones. A long single zone also can be perforated in fewer runs without the hole being subjected to excessive explosive forces.

As a rule, jet perforating has been limited to a 10-ft. to 20-ft. run to avoid excessive shock. With Western's "Selective Rocket Jet," longer gun sections may be run into the well, with limited footage fired at one time to reduce shock.

High perforation densities can be obtained by reperforating the same zone on one run. In the past, solid zones contained "blank areas" following perforating jobs; these were caused by the connecting "subs," which are used to join separate gun sections. With Western's selective firing system, these dead spots are eliminated by repositioning the tool after each gun section is fired.

A varied number of gun sections can be run into the hole at one time and fired individually as desired. The tool can be checked with surface instruments after each section is fired, and, while the tool is still in the well, to insure that the firing circuit is operative. Each gun section uses a bottom firing assembly to prevent detonation of wet guns. Individual gun sections cannot be fired out of proper sequence.

Instruments already in use throughout the oil industry can be used to check positioning of the guns. Either magnetic casing collar locators or collar wires are used.

The "Selective Rocket Jet" is available in 4-in. or 5-in. O.D. steel carriers. Gun sections may be loaded to handle one to six shots per ft. They use standard charges. Rocket JH charges, another Western Co. innovation, can be used in the 4-in. guns.

Oilmen get low-cost facilities, attractive *Stran-Satin* walls with

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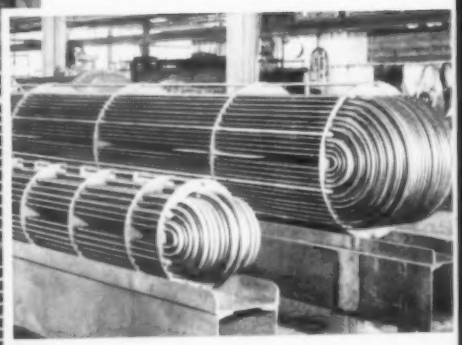

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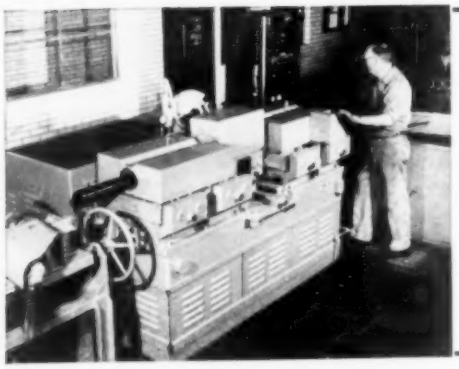

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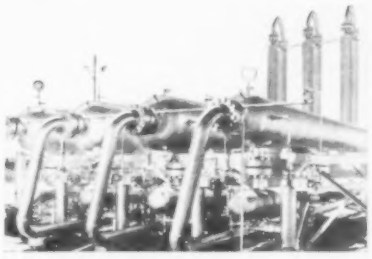

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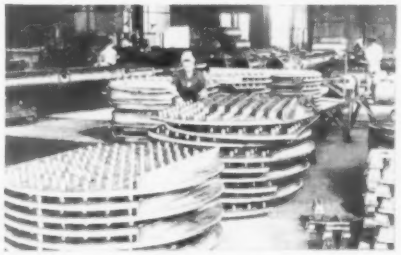

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What's New / IN EXPLORATION, DRILLING, PRODUCTION

Texas Units Approved

Two oil and gas unitization projects have been approved by the Texas Railroad Commission.

French M. Robertson and others will operate a unit covering 1,250 acres in Goldsboro (Gardner) field, Coleman and Runnels counties.

By water injection they hope total oil recovery will be boosted by nearly 3.4-million bbl.

Champlin Oil & Refining Co. will operate a unit of 146 acres in the El Javel (O'Hern) sand, Starr County. It hopes to recover 230,000 bbl. more oil by cooperative water injection.

The commission also approved a request by Bankers Oil Co. to waterflood the Queen Sand reservoir, Malicky field, Pecos County.

In another order, the commission prescribed cementing to protect fresh water sands in all drilling operations, whether the hole is completed or abandoned.

•

Field Trips Announced

The Rocky Mountain Assn. of Geologists will hold its annual field trip for 1957 on Aug. 21-24. The tour will study the stratigraphy, petroleum reservoirs, and mineral deposits of the North and Middle Park areas of northern Colorado.

The 12th annual field conference of the Wyoming Geological Assn. will be held Sept. 12-14 in the Wind River Basin, with headquarters in Lander. Theme of the conference will be: "Factors Affecting the Migration and Accumulation of Oil."

The eighth annual field conference of the Billings Geological Society will be held Sept. 5-7, to study the Crazy Mountains Basin of central Montana. The trip will leave from the town of Livingston.

•

Lease Sales

About 370,000 acres of Navajo Indian Reservations in Utah and Arizona will be offered for competitive bonus bid around Nov. 15.

Paul Jones, chairman of the Navajo Tribal Council, said the long advance notice was being given so that oil companies will have ample time to complete seismic examination of the acreage.

The lands in Utah are all west of existing production in the Paradox Basin. Arizona acreage borders New Mexico, with some of the tracts near gas pools on the southern rim of the Basin.

The June 6 sale of 164 tracts of Navajo lands in northern New Mexico netted more than $500,000. High bid in the sale, third and last of a series involving 564 tracts, was $102 per acre, bid by Southern Union Gas Co. Average bonus for the sale was $22.67 per acre.

High bid of $327 per acre for lands of the Ft. Peck Indian Reservation topped the sale of leases on reservation lands in Montana June 4.

Champlin Oil & Refining Co. and Republic Natural Gas Co. submitted the high bid on a joint basis for an 80-acre tract in Daniels County, northeast of Bredette field. Total bonus for the 223 tracts was $539,824.

School and public lands in North and South Dakota will be offered for oil and gas lease June 19.

The North Dakota offerings includes about 25,478 acres in Billings, Bottineau, Bowman, Burke, Golden Valley, McHenry, McKenzie, Renville, Stark, Ward, and Williams Counties.

South Dakota is offering 28 tracts, ranging from 80 acres to 640 acres, in Fall River, Custer, Pennington, Harding, and Jackson Counties.

The Louisiana State Mineral Board will hold its last lease sale of the current fiscal year on June 20 in Baton Rouge.

Small tracts will be up for lease in Catahoula, Concordia, Tensas, and Allen Parishes.

The bulk of the 2,726-acre offering lies in Cameron Parish.

•

Reiter Foster Oil Corp. has acquired the properties of Advance Petroleum Corp., Dallas, at a cost of $1,675,000. The purchase also included the properties of Carl J. Westlund.

With the combined purchase, Reiter Foster took over the assets and producing properties on 27,000 acres in North Central and West Texas. It also received four drilling rigs, and interest in uranium claims in New Mexico.

The company acquired 54 producing oil and gas wells, two shut-in gas wells, and an oil well awaiting recompletion. Reserves of the acquisition stand at 2-million bbl. of oil and 2-billion cu. ft. of gas.

•

What is said to be the largest elevating-deck drilling barge in operation for the California Co. is being built in a New Orleans shipyard.

The keel of the "Loyd Noble S-66" was laid June 1 at Avondale Marine Ways. The unit is being built for Noble Barge Co., and will be used by Calco in the Gulf of Mexico.

S-66 is designed to operate in water up to 100 ft. in depth. The barge will include space for helicopter landings, and four 800-hp. diesel engines for generation of electricity.

•

The Texas Railroad Commission has reduced the number of producing days in June for four Texas oil pools.

Running "W" (Waddell) field was put on 11 days production. This results from a strike at the Crown Central Petroleum Corp. refinery near Houston. The company had been taking 29% of the field's allowable, but is unable to use any until the plant reopens.

Three pools in Mustang Island field, Nueces County, were also ordered on shorter schedules (11, 12 and 13 days). Renwar Oil Corp., which produces from the pools, told the commission that its purchaser stopped buying June 1, and that it had no other means of handling the crude.

The statewide producing schedule for June is 15 days.

•

A new portable free-standing mast for medium-depth drilling is being offered by Ideco, Inc., one of the Dresser Industries, Dallas.

Named the "Junior Full-View," the new mast has the same basic structural design as the larger Full-Views now in operation.

The mast has twin columns each with a triangular cross-section, which are joined above the racking platform into a one-piece top section. The mast

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may be changed from a 98-ft. doubles to a 132-ft. trebles by adding one section.

Maximum racking capacity for 4½-in. drill pipe is 11,300 ft. with the 132-ft. mast, and 7,560 ft. with the 98-ft. mast.

The substructure, as well as the mast, is portable in road-size packages. The rig may be moved by skidding, with the mast erect, or carried on a truck and dolly with the mast lowered to horizontal.

•

A new diamond core bit, produced by Drilling & Service, Inc., is being used to gather core samples in the highly-fractured Kirkuk field, Iraq.

The first well cored with the new bit obtained an 87% core recovery, compared with previous recovery in the field of 18%. The 24-year-old field, composed of highly fractured and porous limestone, stymied previous attempts to get adequate core samples.

The new bit, named the "Tri-Dia Core Bit," was designed at the field by a D&S engineer after a study of the 1,500-ft. limestone formation. The bit has a three-cornered design, which allows freer movement of mud, removing the hazard of sticking the drill string, a problem common in the area due to fractured formation falling in the hole.

•

Tekoil Corp. may use the miscible phase displacement method of secondary recovery to boost production in 34 newly purchased producing oil wells in Oklahoma's Sunflower pool.

The wells now produce an average of 50 b/d from the Checkerboard formation at a depth of 3,900 ft. Purchase price for the Lincoln County field involved oil payments and an undisclosed cash consideration.

Engineering studies to determine feasibility of miscible phase displacement in the pool were begun several weeks ago.

•

Aerojet-General Corp. has put into manufacture a self-setting bridging plug for oil wells.

The new plug is said to eliminate the need for a setting tool. Instead, the 3-ft. plug is attached directly to the suspending cable, which automatically is released as the plug is set.

•

Drilling Highlights

West Texas—Jocelyn-Varn Oil Co. No. 1 Stella Lloyd, section 25, block K, GH&SA survey, Sutton County, made huge gas flows from both the Strawn and Canyon sands. From Strawn perforations at 4604-40 ft. the project flowed at the rate of 120-million cu. ft. of gas daily plus an undetermined amount of distillate. From the Canyon sand, it flowed gas at the rate of 40-million cu. ft. daily on tests at 5,770-95 ft. The discovery is slated for dual completion.

In Pecos County, Standard Oil Co. of Texas No. 1-24 Perry, was completed as a Pennsylvanian discovery flowing 185 b/d through 16/64-in. choke from perforations at 7,035-55 ft. in the Upper Canyon.

New Mexico—Standard Oil Co. of Texas No. 1-27 Federal, section 27-24n-7w, Rio Arriba County, flowed at the rate of 60 to 70 b/d from Gallup sand through 48/64-in. choke from perforations at 4,759-68 ft.

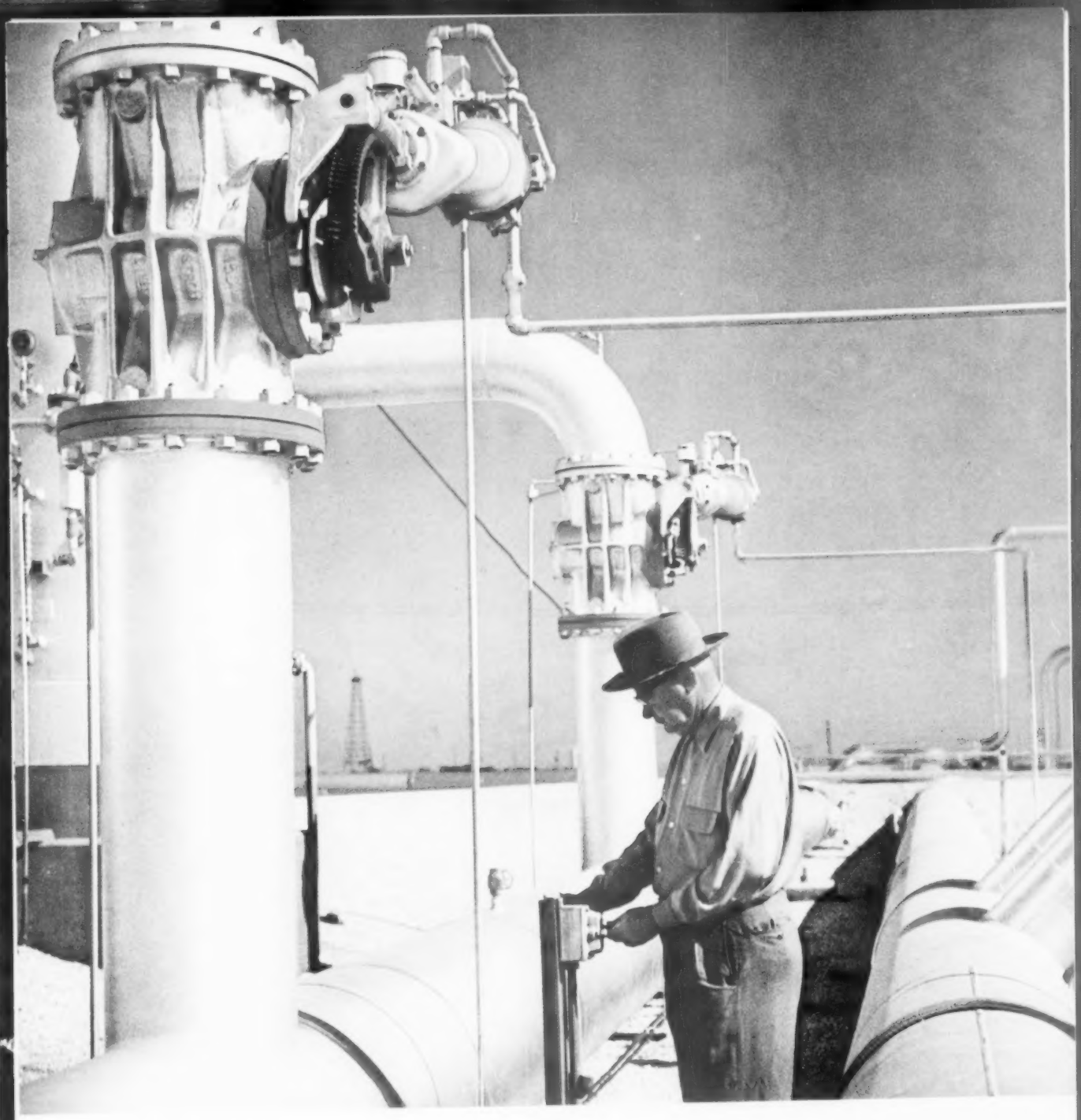
Nebraska—J. M. Huber Corp. No. 1 Olsen, section 11-16n-44w, Garden County, flowed at an estimated rate of 10-million cu. ft. of gas daily from the D sand at 3,036-49 ft. The discovery is 5½ mi. south of the county's only previous production.

Wyoming—Sinclair Oil & Gas Corp. No. 3-B Muskrat, section 7-33n-91w, Fremont County, flowed at the rate of 5,780,000 cu. ft. of gas daily on drillstem test of the Frontier (Cretaceous) at 4,300-21 ft. The wildcat is scheduled to the Phosphoria (Permian) at about 7,200 ft. The test is 2½ mi. southeast of the Muskrat gas field.

Oklahoma—Amerada Petroleum Corp. No. 1 Krob, section 24-25n-13w, Woods County, topped Second Wilcox (Ordovician) at 7,031 ft. and ran drillstem test at 6,973-7,106 ft., open 4 hours. Gas surfaced in 8 minutes and oil flowed in 1 hour, with the project making 137 bbl. of oil in 3 hours. Recovery was 3,000 ft. of oil and 50 ft. of water.

Louisiana—Humble Oil & Refining Co. No. 2-B W. Alton Jones et al, section 30-17s-23e, new oil pay opener south of production in the Little Temple field area, was completed to flow 219 b/d of 34-gravity oil through ¼-in. choke from perforations at 10,870-86 ft.

Texas Gulf Coast—Bankline Oil Co. No. 1 Price and Bill Daniel, Peter Mason survey, A-69, Liberty County, flowed 64 b/d of 37.3-gravity oil from pay at 7,348-51 ft. The discovery is on property that was formerly owned by Texas Governor Price Daniel and his brother.



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Rockwell-Nordstrom valves are available in a complete range of sizes and pressure ratings with electric, pneumatic and cylinder operators. They cost no more to buy—often less—than ordinary valves. Rockwell Manufacturing Company, Pittsburgh 8, Pa.

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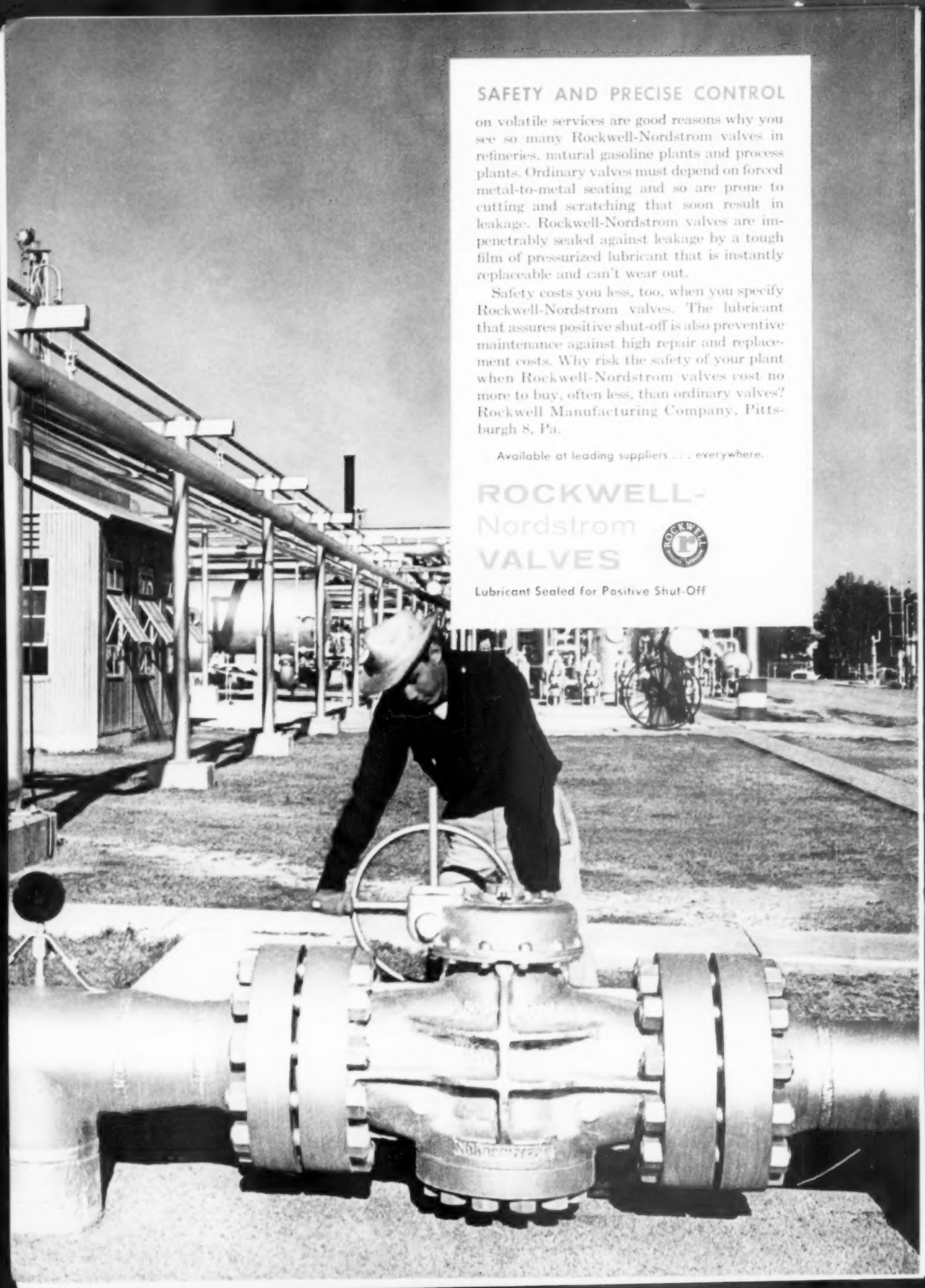

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on volatile services are good reasons why you see so many Rockwell-Nordstrom valves in refineries, natural gasoline plants and process plants. Ordinary valves must depend on forced metal-to-metal seating and so are prone to cutting and scratching that soon result in leakage. Rockwell-Nordstrom valves are impenetrably sealed against leakage by a tough film of pressurized lubricant that is instantly replaceable and can't wear out.

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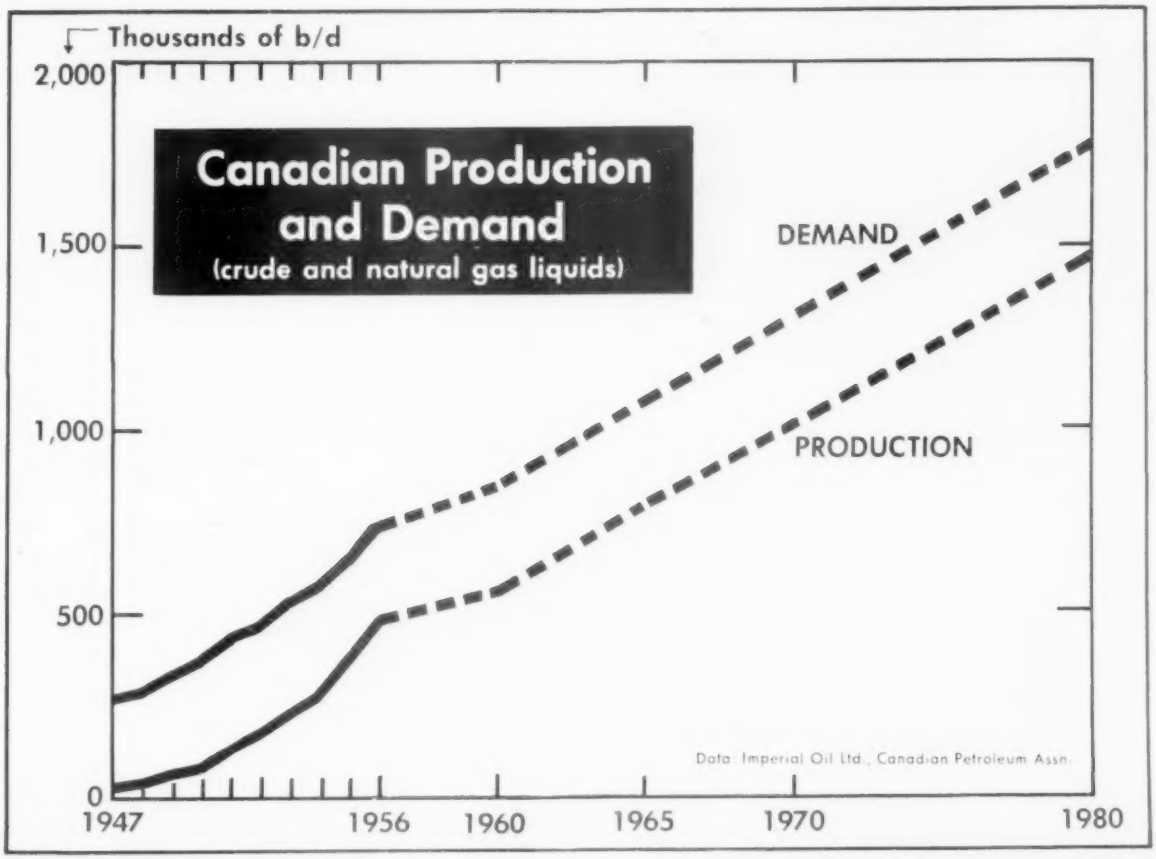
Lubricant Sealed for Positive Shut-Off

PETROLEUM WEEK / SPECIAL REPORT

CANADA

Its ten-year oil and gas growth is only the forerunner of what lies ahead



Story starts on page 42 →

Oil Sparks Dominion's

CANADA's explosive growth oil-wise shows no signs of diminishing.

With the single exception of the Middle East, no area in the world has witnessed such a sensational growth in so short a time. And the momentum thus achieved is expected to continue for years to come.

The turning point came ten years ago last February, when Imperial Leduc No. 1 blew in 20 mi. southwest of Edmonton, Alta. The exploratory effort that well set off has proved what geologists had long believed: Western Canada holds immense reserves of oil and gas. Leduc No. 1 marked the culmination of a previously unsuccessful search for that oil—a search that, in the case of Imperial Oil Ltd., was marked by 133 consecutive dry holes.

That well ushered in a new era not only for the Canadian oil industry, but also for the Canadian economy as a whole.

Since 1947, close to $4-billion has been invested in the oil industry in Canada—in the search for crude and natural gas, for production, refining, and transportation, for petrochemical and allied plants. The accomplishments are there for all to see.

- Reserves have grown from some 72-million bbl. to 3.1-billion bbl. (crude and natural gas liquids).
- Crude production has risen from 20,000 b/d to 470,000 b/d on an annual basis. And latest figures show that it's now running at a rate of 545,000 b/d.
- Oil pipeline mileage has risen from 435 mi. to 5,700 mi., and construction is proceeding at an ever-accelerating pace.
- Refinery capacity has nearly trebled. At the start of 1947 it approximated 246,000 b/d; today it exceeds 710,000 b/d.

The result: Canada today is producing 65% of its

Over-all Economic Progress

fast-growing domestic requirements, whereas only a decade ago it relied more than 90% on imports.

Back in 1947, Canadian crude production was a scanty 20,000 b/d, while its requirements were nearly 270,000 b/d. By 1956, its consumption had nearly trebled, reaching 720,000 b/d; but its crude production had shot up more than twentyfold, hitting 470,000 b/d.

This had a marked effect on its import-export situation, particularly as applied to the United States. A decade ago Canada's crude imports ran 187,000 b/d, well over half of it from the United States. The U. S. was supplying an additional 50,000 b/d of products, while lesser amounts of products were supplied by others. Canada's crude exports were nonexistent.

By 1956, crude imports had jumped to 293,000 b/d, but only 7% of these imports were from the U. S. And Canada was exporting nearly 120,000 b/d of crude, practically all of it to the U. S. Canada's net crude imports thus were actually down (173,000 b/d in 1956 compared with 187,000 b/d in 1947). And exports are continuing to rise. During the first two months of 1957 (latest official figures) they averaged better than 161,000 b/d—again, nearly all to the U.S.

But this tremendous growth is nothing compared with what Canadians expect over the next 25 years, not only in petroleum, but in the whole economy.

Two years ago, the Canadian government decided that "the Canadian people should be more fully informed of the long-term economic prospects of Canada." The Committee of the Privy Council appointed the Royal Commission on Canada's Economic Prospects—more familiarly known as the "Gordon Commission," because it was headed by Walter L. Gordon, noted Canadian industrialist.

There followed 18 months of study by the commission

ers and a large research staff. Assistance was received from many quarters—several oil companies, for example, submitted reports and briefs. Early this year the commission issued a 142-page preliminary report. This report gave the following estimates of growth over the next 25 years:

- **Population may well increase to 26,650,000** from the 1955 level of 15,575,000. It could go even higher if net immigration holds near current levels.
- **Gross national product may triple,** reaching $76-billion.
- **And the average Canadian will have about 66⅔% more net income** for his own use, after paying income tax.

By 1980, petroleum and natural gas will become by far the dominant energy source for Canada, rising to perhaps 70% of the Dominion's greatly enlarged energy needs (table, below).

The dominant role to be played by oil and gas, says the commission, is "perhaps the most striking single thing about forecasts of Canada's steadily mounting energy requirements. The projection of demand for natural gas suggests, in fact, that its consumption may multiply ten or more times within the 25-year period.

"It is clear from these figures," says the commission, "that Canada's future economic development will depend to an increasing extent upon its resources of these fuels."

An even more favorable forecast was made by Imperial Oil Ltd. in its submission to the Gordon Commission. In 1955, said Imperial, petroleum accounted for 47.6% of Canada's energy consumption, natural gas for 4.9%, for a total of 52.5%. By 1980, these two fuels will supply 75.4% of the Dominion's energy needs.

On top of this mushrooming domestic demand will come a tremendous increase in export demand for Canadian crude and gas.

Says the Gordon Commission:

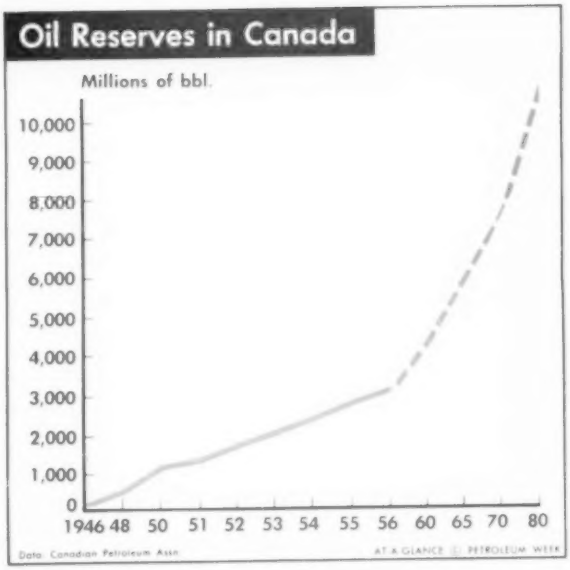
"The potential output of oil in 1980 is estimated at about ten times 1955 production, and between one and a half times and twice the anticipated Canadian requirements in 1980. For gas, the potential output is estimated at over 15 times 1955 output, which will be about 50% more than expected domestic requirements in 1980. This means that there will be large quantities of oil and gas available for export. . .

Canada's Sources of Energy

Source	1926	1953	1980
Petroleum	10%	42%	45%
Natural gas*	2	4	25
Coal	69	39	16
Wood	16	7	1
Water power	3	8	11
Nuclear energy	—	—	2
	100%	100%	100%

*Including natural gas liquids.
Data: Royal Commission on Canada's Economic Prospects.

Oil Reserves in Canada



"Should these exports be realized, our net export surplus by 1980 in oil and gas alone would be over $1-billion per annum, compared with an excess of imports over exports in 1955 of $340-million."

And exports, to the Canadian oil industry, mean exports to the United States. Among the factors that favor this prospect, according to the Gordon Commission:

- Costs of exploration, development, and production of oil in Canada "are lower on the average than similar costs in the United States. In recent years, proven reserves discovered in Canada in new fields and in new pools in old fields, per foot of wildcat drilling, have been almost double the corresponding figure in the United States."
- Canada's proximity to the United States makes it seem probable "that the authorities in that country will continue to look favorably upon programs for increasing the existing oil reserves in Canada."

Just how important the United States might well become in Canada's export picture is indicated in the brief that Imperial Oil submitted to the Gordon Commission. Projecting oil demand to 1980, Imperial showed how Canadian crude production could vary by as much as 1-million b/d, depending upon the volume of crude exports to the U. S.

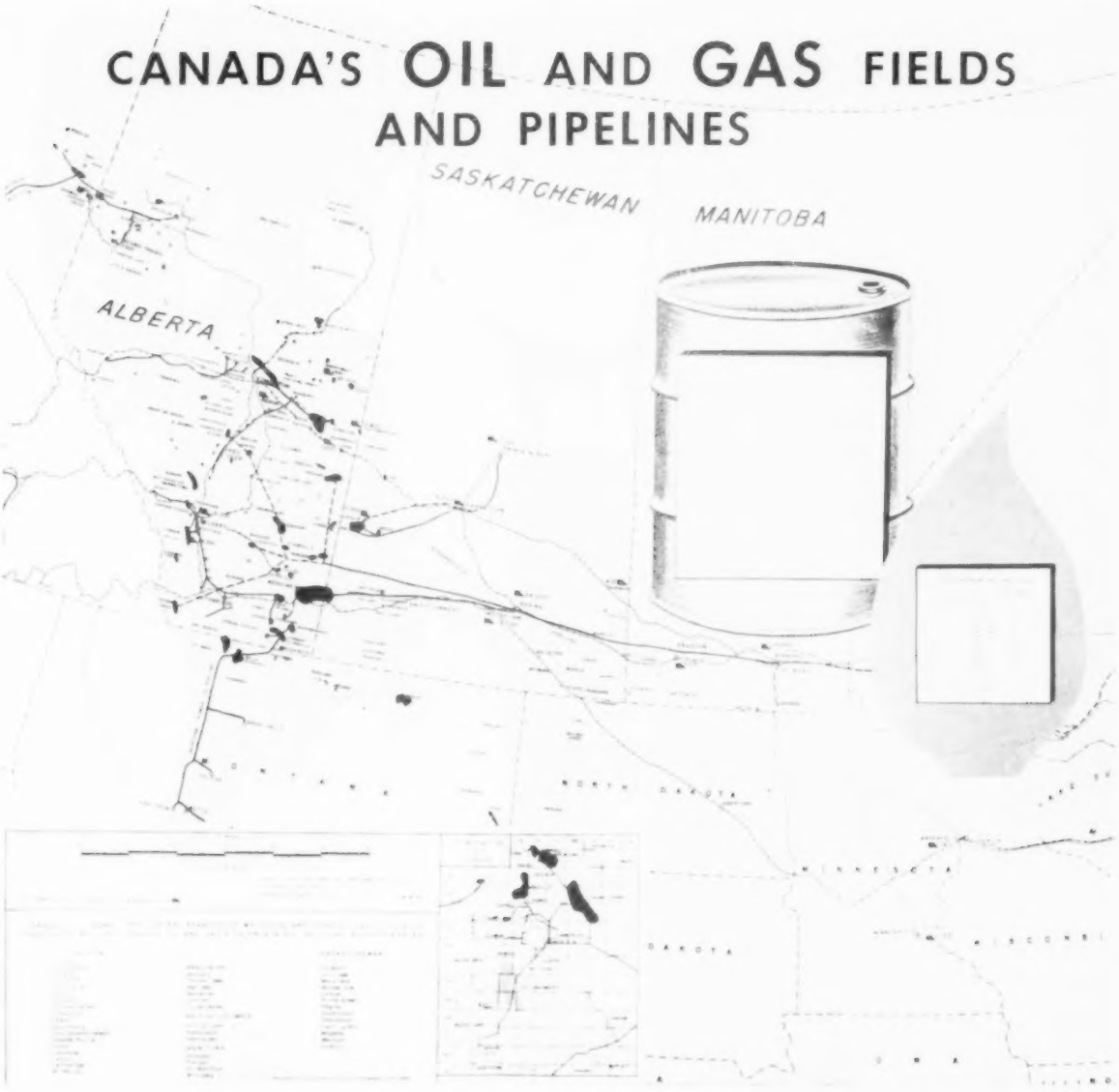
All this means a terrific capital investment in Canadian oil and gas over the next 25 years—possibly on the order of $25-billion, according to the Gordon Commission. This would require a sharp increase in the current rate of investment. By way of comparison, expenditures in 1955 amounted to $450-million for exploration, development, production, transmission, refining, and marketing, the commission says.

To guide this growth effectively, Canadians are considering establishment of a national energy authority, whose powers would extend to oil.

The proposal, embodied in the Gordon Commission's report, called for an agency that would be responsible for:

"Advising the federal government and, upon request,

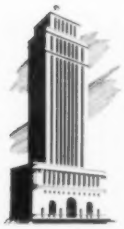
CANADA'S OIL AND GAS FIELDS AND PIPELINES



get this map of buried treasure!

Prepared by the Oil and Gas Department of The Royal Bank of Canada—Canada's "Oil Bank"—this new map measures 43" x 23". Scaled 60 miles to the inch and lithographed in three colors, it shows Canada's principal oil fields, pipelines, potential oil areas, proposed oil pipelines, refineries and daily capacity in barrels. For a copy of this free map and a list of the Royal Bank's current *"Oil and Gas Bulletins"* write to: The Royal Bank of Canada, Oil and Gas Department, 409 8th Avenue West, Calgary, Alta., Canada. These *"Oil and Gas Bulletins"* are revised by the bank as necessary and cover statistics, regulations, tariffs, oil and gas financing and kindred subjects. They are up-to-date and of practical value to anyone seriously interested in Canada's oil and gas industry.

We do not provide information on oil securities.



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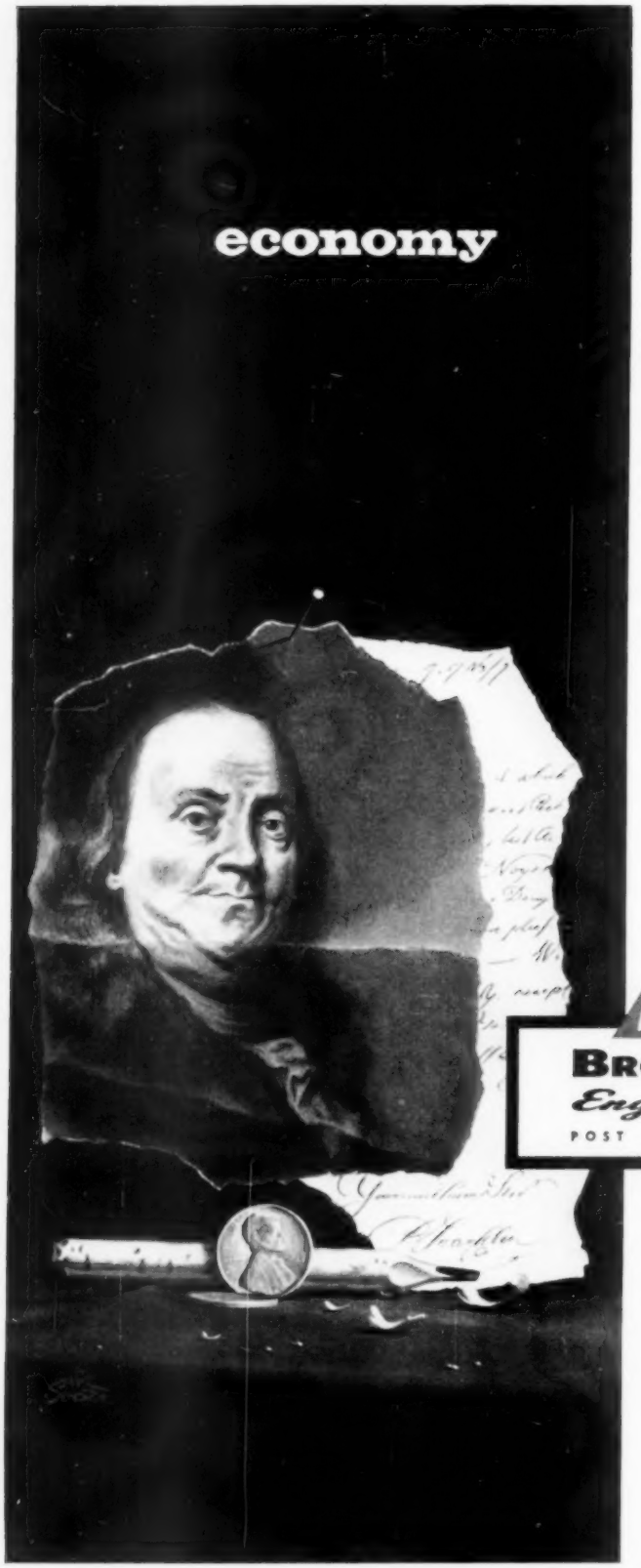

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any provincial government on all matters connected with the long-term requirements for energy in its various forms and in different parts of Canada; methods of promoting the best uses of energy sources from a long-term point of view; export policy, including such questions as the further refining of oil and gas in Canada and the disposal of byproducts; coal subsidies; etc.

"Approving all contracts or proposals respecting the export of oil, gas, and electric power. . ."

But the commission makes it clear that such an agency "would not interfere with the rights of the provinces respecting control over natural resources." (Provinces enjoy much the same rights in this respect as do the individual states in the U. S.)

Western Canada Boasts Vast Reserves

Until the Leduc field was discovered in 1947, Canada had only two oil fields of any significant size: Turner Valley, Alta., and Norman Wells, in the Northwest Territories.

But Turner Valley, discovered in 1914, was declining; and Norman Wells, discovered in 1920, was too remote to supply any markets except the thinly populated northland.

Canada claims the first successful oil producer in North America. Located at Oil Springs, Ont., 80 mi. northeast of Detroit, it was "dug and drilled" some time between 1857 and 1859 (PW—Oct.28'55,p15). It would thus be older than the Drake well of Titusville, Pa., whose accepted completion date is Aug. 23, 1859.

Aside from this section of southern Ontario, and a small segment of New Brunswick, in extreme eastern Canada, practically all of the Dominion's oil exploration was concentrated in the western plains and foothills. Approximately 15% of Canada comprises areas of sediments favorable for oil prospecting, geologists say. And nearly all of this 15% lies in a vast belt sweeping northwesterly from the North Dakota-Montana border through the region lying to the east of the Canadian Rockies to the Arctic Ocean.

This extends over an area equal in size to the five richest oil states in the U.S.: Texas, Oklahoma, Louisiana, Kansas, and California.

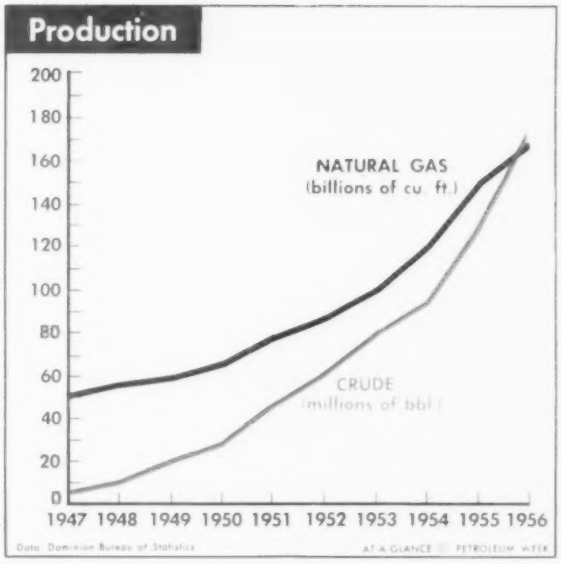
In the late 1920s, all through the 30s, and into the 40s, drilling continued in this region. But except for a few minor discoveries along the Alberta-Saskatchewan boundary, the search was all-but-fruitless. Leduc changed all that when it was discovered.

Today, the list of oil and gas fields runs into the hundreds. There are some 10,300 producing oil wells in western Canada compared with perhaps 400 a decade ago.

These fields are spread over a vast territory, which extends 1,000 mi., from southwestern Manitoba through Saskatchewan and Alberta into northeastern British Columbia.

The territory includes more than a dozen major proven fields, better than twice as many important producing areas, and numerous recent discoveries of considerable significance.

Last year alone, some 2,500 producing oil and gas wells were completed. Oil and gas acreage holdings exceeded 200-million acres. But Canada still has only about one producing well for each 140 sq. mi. of potential oil-bearing land, compared with one well per 12 sq. mi. of prospective sedimentary areas in the U. S. Exploration



and development expenditures in 1956 amounted to $550-million, Imperial Oil estimates.

Success ratio in drilling continues high. Over the past two years, one out of every three or four wildcats has been successful; in the U. S. the ratio is at best one out of nine—and is getting worse.

Now oil men are beginning to worry about the lack of outlets for the crude; production, they claim, is little more than 60% of producibility.

This situation could well affect future drilling programs. Well-heeled producers will think twice about developing capacity to produce crude they can't sell; bankers are inclined to look fishy-eyed at production loan applications under such circumstances.

It's easy to understand, therefore, why producers are casting covetous eyes at potential U. S. outlets for crude, and at the big eastern Canadian market now largely supplied by foreign crude.

Canadian oil interest today focuses almost entirely on the Prairie Provinces of western Canada—although there are minor drilling programs in the Quebec lowlands (PW—Jan.11'57,p18), and some interest has been de-

Crude Production by Provinces

(thousands of bbl./year)

	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
Alberta	6,382.1	10,504.9	19,768.9	27,149.2	45,915.4	58,915.7	76,816.4	87,713.9	113,035.0	143,909.6
British Columbia										148.5
Manitoba					11.8	107.3	656.2	2,147.6	4,144.8	5,786.5
N.W. Territories	231.8	324.1	182.8	189.5	227.4	314.2	316.7	369.9	404.2	449.4
Saskatchewan	521.1	842.9	780.2	1,039.5	1,247.4	1,697.0	2,791.5	5,420.7	11,316.9	21,077.4
Eastern Canada	154.4	198.4	280.2	267.8	212.7	206.1	310.3	424.5	537.5	619.0
Total	7,289.4	11,870.3	21,012.1	28,646.0	47,614.7	61,240.3	80,891.2	96,076.5	129,438.4	171,990.4

Data: Canadian Petroleum Assn.

Reserves by Provinces

(millions of bbl.)

	1950	1951	1952	1953	1954	1955	1956
N.W. Territories	27.3	27.1	26.8	26.4	26.2	53.7	53.3
Alberta and British Columbia	1,165.0	1,328.0	1,526.4	1,624.5	1,928.5	2,170.0	2,391.8
Saskatchewan	10.3	21.0	124.2	182.2	222.4	236.9	358.7
Manitoba		.5	2.1	10.9	29.1	45.2	42.0
Ontario and New Brunswick				1.4	1.5	3.8	3.6
Total	1,202.6	1,376.6	1,679.5	1,845.4	2,207.6	2,509.5	2,849.4
Natural gas liquids*		11.3	65.4	198.1	208.3	247.1	279.0
Grand total	1,202.6	1,387.9	1,744.9	2,043.5	2,415.9	2,756.6	3,129.3

**All in Alberta and British Columbia.*
Data: Canadian Petroleum Assn.

veloping recently in Lake Erie offshore waters (PW—May 17'57,p14).

I. Alberta

Top producing province is, and likely will continue to be, Alberta. Here are located such giant oil fields as Pembina, with an estimated 1¼-billion bbl. of recoverable reserves, Redwater, Leduc-Woodbend, Golden Spike, Wizard Lake, Joarcam, Sturgeon Lake South Westerose and Bonnie Glen—each of them expected to produce well over 100-million bbl.

Alberta holds more than 80% of Canada's presently-proved reserves (table, right) and accounts for a like percentage of current production (table, above). Success ratio in the province is better than the average for western Canada, one out of every 2.8 wildcats being completed as an oil or gas producer last year.

Most active drilling area in Alberta—and in all of Canada—is the great Pembina field, 75 mi. west-southwest of Edmonton. Main oil horizon of the field is the Cardium sands, and these present many technical problems. Practically all wells have to be sandfraced before being placed on production. And, because of the rapid initial decline in pressure, water injection is being undertaken in various sections of the field to improve both immediate and over-all recovery (PW—Mar.29'57,p25).

Pembina now has some 1,825 producing oil wells, and there is every indication that the field is sufficiently large to support a minimum of 3,000 wells—some operators even suggest 5,000 wells as a distinct possibility.

The list of U. S. companies active in the Pembina area reads like a "Who's Who" of the oil industry: Mobil Oil of Canada, Pan American Petroleum, British American, Seaboard, Imperial (Jersey Standard), Plymouth, Phillips, California Standard, Tennessee Gas, Texaco, Sinclair, Ohio Oil, Sun, Continental, Cities Service, and Bishop, among others.

Other Albert areas toward which increasing attention is being devoted this year include:

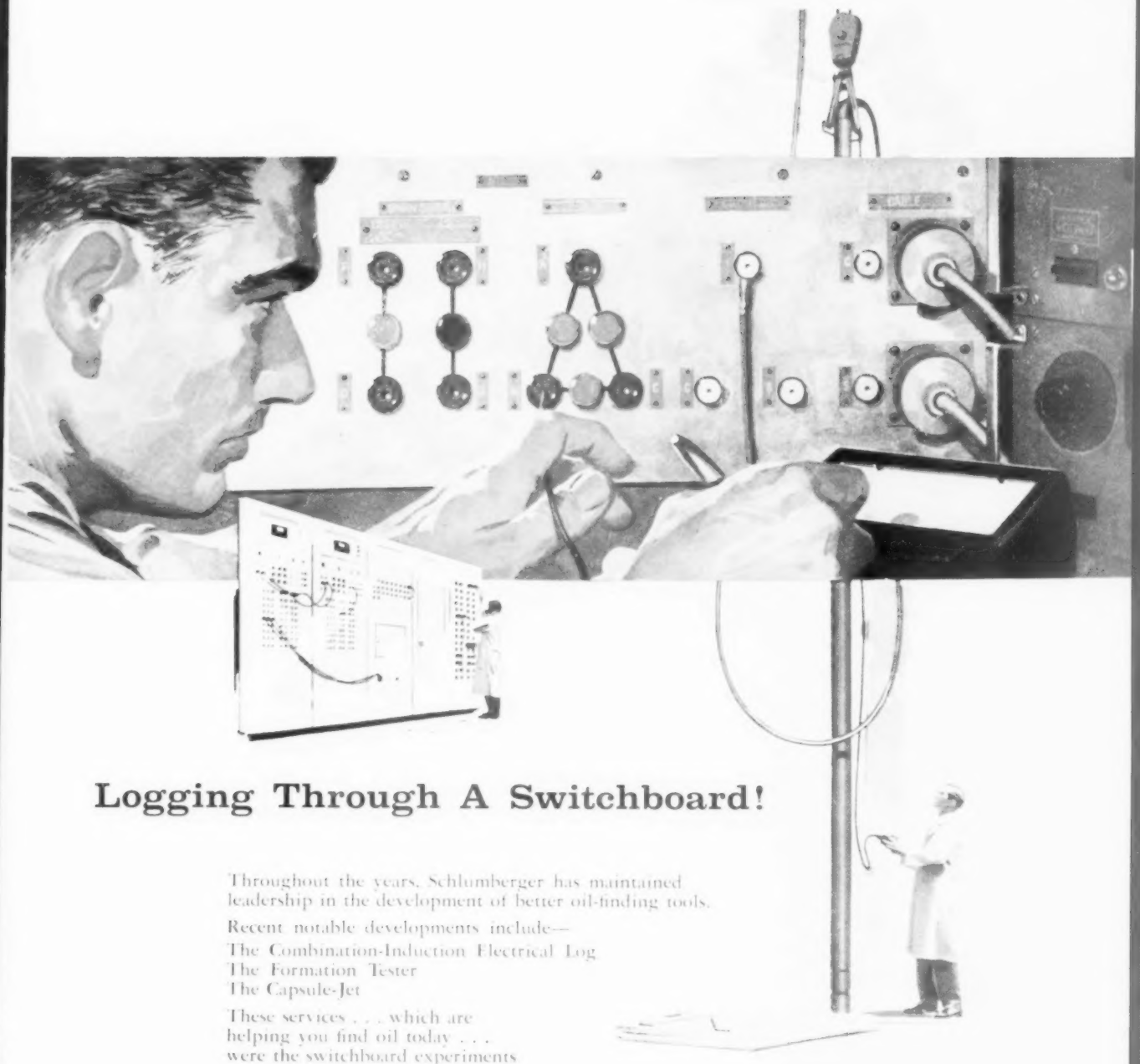
• **The foothills area south of Calgary** to the International border. Husky Oil & Refining, Phillips Petroleum et al are proving up a large gas field at Savanna Creek; Texaco and associates drilled a discovery well west of High River; and Richfield and Medallion found gas at Mazeppa, east of High River.

• **North of Calgary in the Sundre-Westward Ho-Harmattan area.** Several wells are drilling or in the course of completion here. At work in the area are such companies as Home Oil, Calgary & Edmonton Corp., Great Plains Development, Shell, Canadian Superior and Hudson's Bay Oil & Gas.

• **The Granite Wash play,** extending in a great arc from Red Earth, 225 mi. north and west of Edmonton, through Gilwood-Smoky Lake and eastward as far as Prince Albert, Sask. Great Plains Development made the first discovery in the Granite Wash three years ago at Gilwood. But not much attention was paid to this formation, which immediately overlies the Pre-Cambrian basement, until the winter of 1955-56. When Union of California drilled a discovery well at Red Earth, however, the rush was on. More than 20-million acres in leases and reservations were snapped up. This past winter saw increased drilling operations.

• **Sturgeon Lake South,** 150 mi. northwest of the Pembina field. A Devonian reef formation, it provided encouraging results last year in both the Mississippian and Triassic horizons, in addition to the excellent thick reservoir in the D3, which now has more than 80 producing wells.

• **The Virginia Hills-Swan Hills country,** some 125 mi. northwest of Edmonton (PW—Jun.7'57,p19). This virgin area has been the scene of four important strikes in



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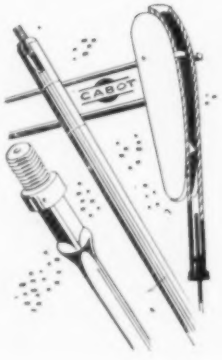

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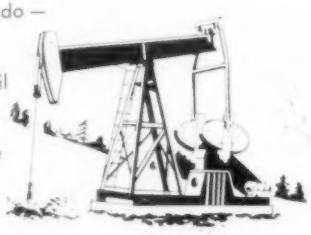

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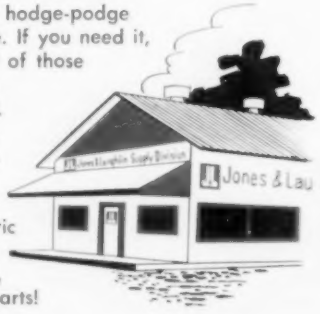

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221

recent months. New drilling play is expected to be heavy next winter, when equipment can be moved in.

Exploration and drilling are really tough in these northern Alberta areas. The weather, extreme distances, a paucity of transportation facilities or roads of any kind, and the ever-present muskeg combine to make operations as difficult as can be encountered in any oil region in the world. The muskeg, for example, can be encountered as deep as 60 ft. in northern Alberta, thins down to 10 or 12 ft. nearer Edmonton. Only when it is frozen solid can men and equipment move across it; this normally limits activity to four or five months in the dead of winter—when bitter cold must be braved.

Another Alberta oil resource—the fabulous Athabasca tar sands—is beginning to attract increasing attention (PW—Feb.8'57,p20).

The tar sands hold an estimated 300-billion bbl. of oil. They spread over an area of about 30,000 sq. mi. along the Athabasca River and its tributaries in northeastern Alberta.

Royalite Oil Co., Ltd., and Can-Amera Oil Sands Development Co., both of Calgary, are planning a $50-million program for development of the tar sands. They have set a production target date of 1960.

Other companies also are working on plans for developing the tar sands. Firms with holdings in the area include Shell, Richfield, Union, Supertest Petroleum, a group headed by Calvan Consolidated Oil & Gas (a Canadian Petrofina subsidiary), Sun, Canadian Pipelines, Great Canadian Oil Sands, Mic Mac Consolidated, Bailey Selburn, Baysel Pipelines, and Home Oil.

II. Saskatchewan

Probably the "hotest" oil area in western Canada lies in southeastern Saskatchewan. A list of the ten most active drilling areas in Western Canada finds three from this region: Steelman, Midale, and Weyburn. The first two already are rated as major fields, with recoverable reserves estimated at 100-million bbl. for Midale and 200-million bbl. for Steelman. Total recoverable reserves in this area are now estimated at more than 1-billion bbl. And much of it is high-gravity oil.

Success ratio in Saskatchewan as a whole last year was one for each 3.6 wildcats drilled. But in the 5,000-sq.mi. district comprising southeastern Saskatchewan the success ratio was much higher.

Some 80% of Saskatchewan's discoveries were made in this region, although only 40% of the wildcats were drilled there. In the first half of 1956 one company, Imperial Oil, actually drilled more discoveries than dry holes: 7 to 6.

Such achievements explain why operators have rushed equipment and personnel to the region, why drilling is progressing at a furious pace.

One result of this activity: The Saskatchewan Mineral Resources Dept. last month enlarged the Steelman field to include three adjoining ones. They are the Kingsford, Lampman, and Frobisher fields (PW—May10'57,p61).

Exploration here is moving steadily closer to the Saskatchewan-North Dakota border. This summer, four wildcats will be drilled along the international border as part of an 18-well program for Canadian Oil Cos., Ltd.

Oil men see this as a natural development. For southeastern Saskatchewan lies in the Williston Basin, which encompasses western North Dakota and parts of South Dakota and Montana. Drilling on the American side of the border has been stepped up—encouraged at least in part by successes on the Canadian side.

Meanwhile, crude production in Saskatchewan has been climbing rapidly (chart, page 48). Last year, 21-million bbl. moved to refineries in Canada and the U. S. And the rate is steadily increasing. Average production last year was 57,600 b/d; it had increased to 83,000 b/d by early 1957.

III. Manitoba

Only the extreme southwest corner of Manitoba lies within western Canada's potential oil-bearing region—a fact borne out by results achieved.

Only 4 of the 44 wildcats drilled in 1956 were successful; the year before it was 16 of 69. Drilling activity as a whole (exploratory and development wells) also declined: 361 wells were drilled in 1955; 254 in 1956.

Production last year went up (table, page 48) as the logical result of previous years' development work. But reserves declined (table, page 48).

IV. British Columbia

Recognized for several years as an important gas-producing region, British Columbia is beginning to show promise of developing oil-wise (PW—May3'57,p.24).

Back in 1955, the success ratio of wildcats in northeast British Columbia (where all activity is concentrated) was one in three. Only one producer was oil, 12 were gas. Last year the province had a success ratio of two out of every five wildcats—and all successes were gas.

But there have been recent oil strikes at Milligan Creek, in the already-established Boundary Lake field, and in the heart of the vast Fort St. John gas field.

All of this portends even greater exploration and drilling activity when weather conditions in this remote, muskeg-covered region permit.

But gas producton is certain to become increasingly important as outlets for the province's huge gas supplies develop. Just the existence of the Fort St. John field, with its estimated 3-trillion cu. ft. of reserves, assures this. And there are other known fields on which little or no development work has done, pending availability of a market for gas.

V. Northwest Territories. Yukon

The vast wilderness of Northwest Canada is attracting increasing exploratory activity. This past winter, American and Canadian oil companies spent an estimated $50-million keeping exploration crews busy in that area (PW—Mar.16'57,p20).

Aside from the Norman Wells field, discovered in 1920, the only discovery of any significance has been Briggs No. 1 Rabbit Lake, not far from the western borders of Great Slave Lake. This gas well, discovered in 1955, is shut in.

Exploration and drilling difficulties are extreme in these territories. Only when the muskeg is frozen can movement across the ground be undertaken. And drilling costs are roughly double those for a comparable well in southern Alberta or Saskatchewan.

Oil, Gas Transport Pattern Shifts

This year may well go down in Canadian petroleum history as the time when (1) natural gas came into its own as a fuel, and (2) a definite shift to a two-way pattern for Canadian crude movement took shape.

Up to the present, natural gas has been serving markets largely in the areas of gas production, particularly in Alberta. Latest available figures (1955) show this province alone consumed 88% of the marketed production of natural gas in the dominion. At present it is the only province that has an extensive gas distribution system.

And Alberta's dominance in crude production made it the focal point of all major crude movements in Canada. No other province produced enough crude to make any difference in the pattern.

Gas pipeline construction projects now under way will link the gas fields of the West with major markets elsewhere in Canada—and with markets in the U. S.

Before the year is out, Westcoast Transmission Co. is expected to begin moving 400-million cu. ft. of gas daily over its now-building 650-mi. line. This 30-in. line will tap the gas reserves of the Peace River region of northern British Columbia and Alberta. Gas will be transmitted to markets in southern British Columbia; the line also will tie in to the Pacific Northwest Pipeline Corp. system to establish a huge gas transmission grid along the West Coast (PW—Jul.22'55,p24, Nov.16'56,p32), drawing gas from both Canada and the United States.

Eventually, Westcoast Transmission's capacity will be stepped up to 660-million cu. ft. daily, with about 80% of the gas being exported to the U. S.

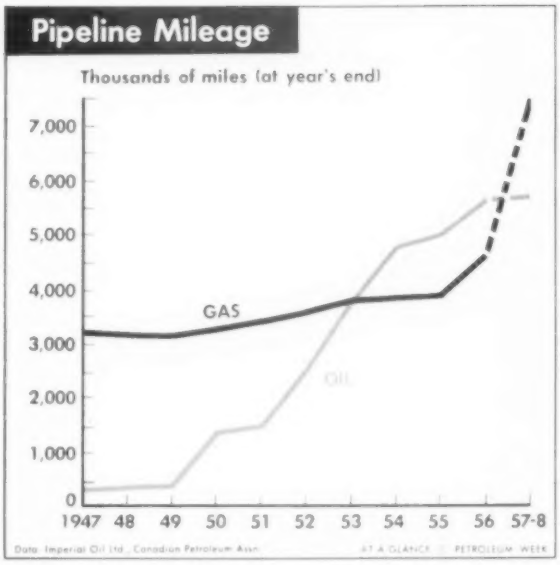
Trans-Canada Pipe Lines, Ltd., hopes to be piping gas to Winnipeg late this year. Eventually, this line will supply Alberta gas to markets in the Toronto and Montreal areas. It will cost an estimated $383-million, including $130-million for a 675-mi. stretch across northern Ontario, to be built by a Crown company formed by the Canadian and Ontario governments. This section of the 2,250-mi. line will be leased to Trans-Canada.

Pending before the U. S. Federal Power Commission is a deal under which Trans-Canada would sell gas to Tennessee Gas Transmission Co. for disposition in the U. S. Under this contract, TGT would take 200-million cu. ft. daily and a like amount in addition when it's available. It would be delivered via a lateral line from Winnipeg to the international boundary at Emerson, Man.

TGT wants to use this gas for markets in North Dakota, Minnesota, Wisconsin, Illinois, Indiana, and Kentucky (PW—Feb.17'56,p9). But it has formidable opposition from others already serving these areas.

To supply Trans-Canada with needed gas, the Alberta Conservation Board has designated 19 gas fields in central and southern Alberta. These will be tied to the pipeline as the need for gas requires. Other fields will be added as the market grows.

One of Canada's most spectacular gas fields, Savanna Creek, located about 60 mi. southwest of Calgary, still lacks a market outlet. Discovered in 1954, it was expanded last year with additional drilling. Today it ranks as one of Canada's largest gas reservoirs. Plans call for tieing this gas supply into the Pacific Northwest-Westcoast Transmission system (PW—Jan.18'57,p38).



Estimates of gas reserves in Canada are uncertain. But in Alberta alone, experts calculate, they are on the order of 21-trillion cu. ft. Another 3-trillion cu. ft. or more exist in the British Columbia sector of the Peace River region.

Geography is the major moving force in the growing two-way trend of Canadian crude movement (PW—Mar.8'57,p26).

Up to a few years ago, Alberta was the one big source of all crude in Canada. Most of this moved eastward via the Interprovincial Pipe Line. Then two things happened:

- Pacific Coast demand for crude soared as refineries sprang up in the Puget Sound area and the 787-mi. Trans Mountain Oil Pipe Line was constructed to serve them. (This line also opened the door to exports to California.) Alberta crude supplies this market.
- Major oil discoveries were made in southeastern Saskatchewan. Saskatchewan is hundreds of miles closer to major refinery centers in eastern Canada and midwestern United States than is Alberta. Logically, therefore, Saskatchewan crude gets the first call for eastern markets.

Westward movement of Alberta crude is sure to increase. Trans Mountain is boosting its capacity from the present 185,000 b/d to 240,000 b/d through a looping program scheduled for completion in August. Eventually, capacity may go to more than 500,000 b/d. And preliminary planning is under way on a line running from the Peace River region to tidewater (PW—May3'57,p24).

Meanwhile, predictions are freely made that oil production in Saskatchewan will reach 100,000 b/d this year. Such a volume wouldn't fill all of the Interprovincial Pipe Line's requirements, for they run about 265,000 b/d. But it could make a big dent in the quantity of Alberta crude moving eastward.

Independent producers in Alberta are worried over

the threat this poses to their crude sales; they want to see their major eastern markets expanded to meet rising output.

And here the arguments begin to take a turn that is highly reminiscent of the controversy in the U. S. between independent producers and the international companies.

Canada's richest market for petroleum lies in the industrialized areas of Quebec and eastern Ontario. These two provinces contain more than 60% of the Dominion's population; six of its ten largest cities are located within their borders.

At present, Interprovincial Pipe Line Co.'s crude line stretches 1,770 mi. from Redwater and Edmonton, Alta., to the refinery district at Sarnia, Ont. And contracts have been awarded to extend it 157 mi. eastward to Toronto.

Now there is pressure to continue the line 450 mi. farther eastward to Montreal, where a major crude market —more than one-third of Canada's refining capacity—is located. Such a line, it is argued would provide an outlet for 150,000-200,000 b/d of western Canada's crude.

Despite the tremendous increase in Canadian crude production, the Dominion still imports better than 45% of its crude requirements. (Exports from western Canada reduce net imports to 35% of demand.)

Canadian independents would like to see these imports replaced by Canadian oil. Unless this happens, they fear, there will be more and more shut-in production in western Canada, a definite slowdown in drilling activity.

But the majors—including some with big crude holdings in Canada—don't see it that way.

They claim it would put Alberta in a most vulnerable position. To reach the Montreal market now, these people contend, producers might have to accept a Montreal delivered price which would result in wellhead prices 20¢ to 30¢ a bbl. lower than they now are getting. (Pipelines might absorb some of this cost. But that is questionable.) Even then, there would be no assurance that Venezuela or Middle East suppliers would not drop their prices to hold this business. This, they say, would throw the whole Canadian crude pricing pattern askew.

To assure the financing of a Toronto-Montreal crude line, firm contracts for 60% to 70% of the Montreal market's crude needs would be required. And that doesn't appear feasible right now, in the opinion of many oil men.

Immense Refinery Expansion Needed

Despite a threefold increase in the past decade, Canada's refinery capacity still is insufficient to meet the Dominion's product needs. Product imports make up the difference.

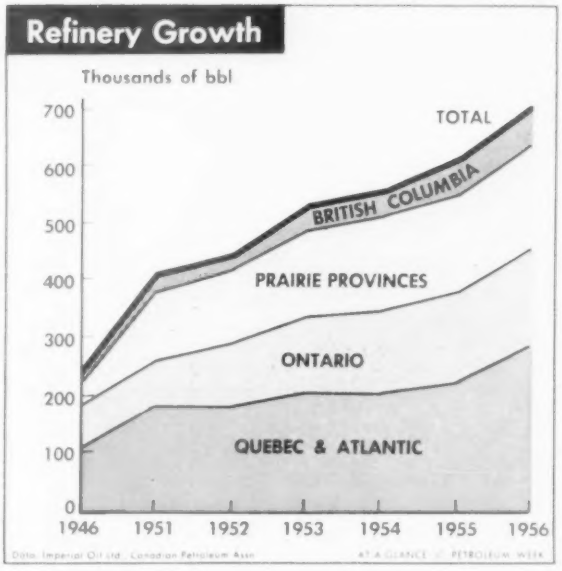
Ten years ago, refinery capacity was approximately 246,000 b/d; today it is 710,200 b/d. Refinery runs last year averaged 630,000 b/d. But 1956 product demand in the Dominion (including a small amount for export) averaged 728,000 b/d. Thus, product imports of around 98,000 b/d—some 60% from the U. S.—were required to meet market demand.

Further expansion is under way; but many of the new units are for product quality improvement, chiefly the higher-octane gasolines that are demanded by today's automobiles.

A plant survey published in the May issue of Petroleum Processing, a McGraw-Hill publication, lists two new refineries in the works—a 30,000 b/d, $30 million dollar plant for BP (Canada), Ltd., at Montreal, and a plant of undetermined size for Delkay Oil, Ltd., at Edmonton. In addition, seven companies have improvement or expansion projects involving 15 refineries.

Included are two crude distillation units totaling 40,000 b/d capacity; two catalytic crackers of 8,100 b/d capacity; a thermal cracking unit of 1,600 b/d capacity; seven cat reformers, 27,550 b/d; five hydrogen treating units, 41,500 b/d; a visbreaking unit; 3,000 b/d; and two polymerization units, capacity 670 b/d of product.

In addition to these, Cities Service Co. has announced that it will build a 20,000 b/d refinery in the Toronto area (PW—Dec.7'56,p11). And British American Oil Co., Ltd., will erect a 20,000 b/d plant near Vancouver (PW—Mar.15'57,p54).



This expansion won't alter the fact that Eastern Canada is the dominant refining area of the nation—and will continue to be so.

Canada's West Coast refineries account for a little less than 10% of total capacity. Most of them are located in the busy Vancouver area.

Scattered over the western plains, from Ft. William to Dawson Creek, from Winnipeg to Norman Wells, lie

BIGGEST REFINERY in Canada is Imperial Oil's 80,000 b/d plant at Sarnia, Ont. Shown here is the cat cracker.

refineries accounting for a little better than 27% of the Dominion's processing capacity. These plants serve local or, at best, regional product demand. Heaviest concentrations are at Edmonton and Regina.

The remainder of Canada's refineries—more than 63% of the total—lie in eastern Canada. And most of them are concentrated in three areas: Sarnia, Toronto, and Montreal. The plants serve the large urban and industrial centers of the region. Sarnia output moves eastward largely through two product lines with a total capacity of 100,000 b/d. Some products also are piped from Montreal to Toronto.

These eastern refineries depend largely on imported crude. Even at Sarnia, terminus of the Interprovincial crude line from Alberta, one refinery (Sun Oil Co., Ltd.) uses crude from the U. S. Gulf Coast. The big refining centers around Toronto and Montreal, and a newly enlarged refinery at Halifax, N. S., depend on Venezuela, Middle East, and Trinidad crude.

Based on capacity, roughly 47% of Canada's refineries depend on imported crude. Supporting this is the fact that last year's refinery receipts were divided 46.6% imported crude, 53.4% domestic crude.

This ratio of domestic to imported crude appears to represent a plateau—at least a temporary one. For it has held at just about 47%-53% level since 1954. Prior to that, refinery receipts for years had shown a steadily increasing proportion of domestic crude, correspondingly less of imported.

Over the long run, Canada's refineries undoubtedly will use more and more domestic crude. But some oil men, at least, believe imports of crude and products will never be eliminated.

This type of thinking is exemplified in the brief that Imperial Oil Ltd. submitted to the Gordon Commission while the commission was making its study of Canada's long-range economic prospects.

One table in Imperial's brief projects Canadian crude and products supply and demand from 1955 through 1960 to 1980. It shows this trend:

	1955	1960	1980
	(Thousands of b/d)		
Domestic crude*	304	423	1,390
Crude imports	226	260	110
Products imports	93	125	253
Total domestic demand	623	808	1,753

*Total crude production less exports

On this basis, the ratio of domestic and imported crude going to Canadian refineries may be expected to change from 57:43 in 1955 to 62:38 in 1960 and 93:7 by 1980. (Product imports, while showing a large aggregate rise, actually represent only about 15% of total demand in each instance.)

But regardless of the crude they may use, Canada's refineries must expand tremendously if they are to keep pace with the Dominion's mounting product needs.

Imperial's forecast of oil demand (table, above) was made more than a year ago. It indicated a rise of nearly 50% in the five years from 1955 to 1960 (from 623,000 b/d to 808,000 b/d). Actual increase in just the single year from 1955 to 1956 was 14% (from 630,000 b/d to 720,000 b/d). And oil men look for a further gain of 10% to 12% this year.

Based on Imperial's obviously conservative forecast, therefore, refinery runs may well have to increase nearly 2½ times in the next 20 to 25 years (1,500,000 b/d by 1980) if they are to keep abreast of product needs.

Along with this refinery expansion will come a marked stepup in petrochemical facilities (PW—Jul.13'56,p34).

Though still in its infancy, the petrochemical industry already is supplying Canadians with large quantities of products made of plastics, synthetic fibers, synthetic rubber, and other chemically-made substances derived wholly or partly from oil.

Much of the presently-planned growth will take place in Canada's "Chemical Valley" around Sarnia. Here Ethyl Corp. of Canada, Ltd., completed last year an $11-million tetraethyllead plant, with sufficient capacity to meet the Dominion's need for the antiknock compound. And here Imperial Oil, giant of Canada's oil firms, is spending $33.5-millions for two plants to manufacture chemical raw materials.

One will provide the chemical industry with a large new source of basic materials—thus promoting the establishment of chemical processing plants in the area. The other is a detergent alkylate plant.

These and other plants are linked to (1) availability of refinery light ends as raw materials, (2) the now-assured Trans-Canada gas pipeline to provide more raw materials for petrochemicals, and (3) the projected LPG pipeline from Alberta to Ft. William, Ont., which will open the way to tanker shipment of butane, propane, and the like to Sarnia (PW—Mar.23'56,p46).

In the Montreal area, petrochemical expansion is under way. In the Prairie Provinces, growth is expected to be rapid as refineries expand and the supply of gas liquids increases.

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Demand for Products is Flourishing

Canada is not only an increasingly important producer and refiner of petroleum; it is also a large—and fast-growing—consumer of oil products.

A decade ago, per capita consumption of oil in the dominion was roughly half that of the United States (6.6 bbl. per year vs. 12.7 bbl. per year). Today, it is 82% as great (15.7 bbl. per year vs. 19.2 bbl. per year). Its oil demand over this ten-year stretch has grown from 222,000 b/d to 720,000 b/d. By regions, the increase looks like this:

Region	1946	1956	% gain
British Columbia	23,088 b/d	71,000 b/d	308%
Prairie Provinces	47,952	148,000	310
Ontario	74,370	260,000	350
Quebec	56,899	194,000	341
Atlantic Provinces	19,691	61,000	310
Total Demand	222,000	720,000	324

"High living standards, long distances, and mechanized farming make oil of key importance to Canada," one leading oil economist explains. The result is that:

- "Canadians are, per person, the second highest consumers of petroleum in the world" (exceeded only by the U.S.).
- "Canada, as a nation, is the third largest consumer of oil in the world.
- "One-third of Canadian homes are heated by oil.
- "There is one motor vehicle for every four Canadians.
- "There are three tractors for every four occupied farms in Canada."

And everything points to a long-time growth in this market; forecasts are freely made that by 1980 it may be 2½ times as great as today.

The Canadian Petroleum Assn., in a presentation to the Gordon Commission, predicted that Canadian demand would reach 854,500 b/d by 1960, 1.3-million b/d by 1970, and nearly 1.8-million b/d by 1980.

And Imperial Oil, in projecting 1980 demand at 1,753,000 b/d by 1980 (page 54), supports its forecast with figures like these:

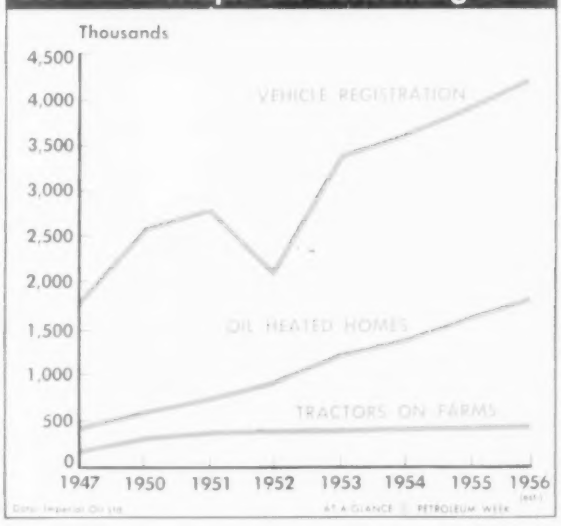
- Population in that year may well reach 24.5-million persons, compared with 15.6-million in 1955. (This is some 2-million less than one estimate put forward by the Gordon Commission.)
- Cars in use may total 7.1-million, against 2.6-million in 1955.
- Automotive gasoline consumption may rise to 544,500 b/d, compared with 213,800 b/d in 1955.

With such a growth in prospect, oil marketers are scrambling for business—particularly in the lush Quebec and eastern Ontario regions.

These two provinces accounted for 57.6% of Canada's total crude and product demand in 1955; in 1956 they represented 63%. In the years ahead, their share may grow even greater.

So here, to a greater degree than in other parts of the dominion, new competition and major ownership changes are challenging the long-standing marketers, most of which are affiliates of U. S. majors.

Growth in Major Oil Consuming Units



Illustrative of what is going on are these examples:

- BP (Canada), Ltd., a newcomer, is building a 50,000 b/d refinery at Montreal to supply the retail outlets it is lining up.
- Regent Refining (Canada), Ltd., with 600 outlets in Ontario, has moved into the Montreal market. Regent is controlled by The Texas Co. (PW—Sep.14'56,p42), which also controls McColl-Frontenac Oil Co., Ltd., another important Canadian marketer.
- Canadian Petrofina, a relative newcomer to Canada (PW—Mar.23'56,p26), has developed more than 1,500 outlets in a little over three years. And it is now preparing to boost capacity of its 20,000 b/d refinery at Montreal to 50,000 b/d. Fina also is erecting "junior" service stations, particularly in rural areas (PW—Feb.22'57,p82). These stations cost about $26,000—half that of the company's standard stations.
- Imperial Oil (affiliate of Jersey Standard), whose 9,600 stations account for close to half of all Canada's retail gasoline sales, has earmarked a substantial part of its $160-million 1957 capital outlay specifically for marketing purposes.
- Cities Service Oil Co., Ltd., with 700 outlets in Ontario, will build a 20,000 b/d refinery near Toronto.
- Irving Oil Co., St. John, N. B., a marketer in the Maritime Provinces, reportedly has purchased a terminal site below Montreal. This could be the first step in a move to enter the Quebec market.
- Out in the Prairie Provinces, Husky Oil & Refining Ltd., is expanding its market operations eastward to serve western Ontario.

Canadian marketers are staying aloof from the battle over two or three grades of gasoline. Apparently they prefer to watch developments in the U.S. before they make any strong commitments. A few smaller marketers are offering three grades, however.

U.S. Has Big Stake in Canada's Oil

U.S. oil companies and private investors wield a terrific influence on Canadian oil. Fully $1.1-billion in U.S. capital was poured into the industry in the 1945-55 decade, and the amount continues to grow.

This $1.1-billion represents nearly one-half of the $2.4-billion gross capital inflow from the U.S. for direct investment in Canadian industries of all kinds. And the figures do not include earnings retained by the Canadian firms owned and controlled by U. S. investors.

Large Canadian oil enterprises have been particularly attractive to U.S. and other foreign investors. Of all capital invested in Canadian oil companies with a capital of $25-million or more, 95% is controlled outside Canada.

Two big 1956 deals exemplify this trend: Gulf Oil acquired control of British American Oil (PW—Apr.27'56, p12); and Texaco added Regent Refining to its previous Canadian holdings (PW—Sep.14'56,p42).

U.S. investments in Canada encompass every phase of oil operations, from production through marketing, and include service and equipment companies as well.

Hardly a major project is undertaken in Canada today without some substantial U.S. money being represented. This extends to the big natural gas transmission lines like Trans-Canada Pipe Lines, Ltd., in which U.S. oil companies or individuals such as Tennessee Gas Transmission, Conoco, Gulf, and C. W. Murchison have an interest; or Westcoast Transmission Co., Ltd., in which Pacific Northwest Pipeline Corp. and Sunray Mid-Continent Oil Co. are big shareholders.

In addition to U.S. oil companies' "knowhow," one big reason favoring this large investment is the Canadian tax situation.

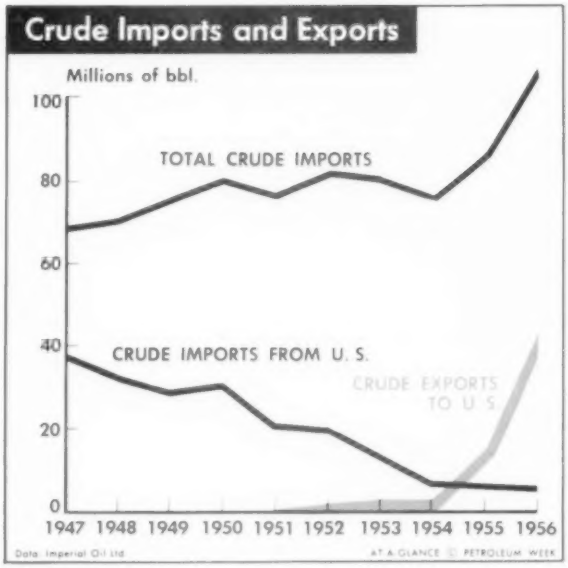
The Gordon Commission, in its preliminary report on Canada's prospects, had this to say:

"Very generous tax treatment is given in the United States to individuals and to companies who invest in the oil and gas industry . . . These tax policies place United States citizens and United States oil companies in a preferred position in searching for oil in Canada, compared with Canadian citizens and Canadian companies. But this does not mean that Canada should necessarily adopt the same policy. . ."

The commission also noted that "the method of computing depletion allowances is not so favorable in Canada as in the United States and, furthermore, it gives a substantial advantage to the large integrated oil companies as compared with the independent producers. . . .

"No allowance is granted for depletion until all accumulated expenditures on exploration and development have first been exhausted as deductions in computing taxable income. This gives considerable advantage to the large integrated oil companies. . . [They] are permitted to offset their exploration and development expenditures against their total income, including their income from refining and marketing. In this way, their exploration and development expenditures may be immediately financed to a considerable extent by tax money."

The fact that U.S. investors control some 70% of the Canadian oil industry has prompted Canadians to suggest some tangible moves that American companies might well make to offset Canadian antipathy.



"Canada has always welcomed the investment of foreign capital, and has greatly benefited and will continue to benefit from the foreign capital that has been invested here," says the Gordon Commission. "It is obvious that without foreign investment the rate of growth and development in Canada would have been much slower . . . Nevertheless if, as seems likely, the present trend continues . . . it seems probable that this will continue to cause concern in this country" (PW—May11'56,p12). So the commission suggests that foreign concerns:

- **Employ Canadians in senior management and technical positions,** retain Canadian engineering and other professional and service personnel, and purchase supplies, materials, and equipment in Canada, wherever possible.

"By and large," the commission concedes, "Canadian subsidiaries of foreign concerns do employ Canadians in senior positions whenever they can find qualified men to fill them. And there are many examples of people who have come here from abroad to manage Canadian subsidiaries who have become useful and helpful Canadian citizens in every sense of the term."

- **Publish financial statements and make full disclosure therein of their Canadian operations.**

"If these concerns. . . were owned in Canada," the commission observes, "they would be required to supply copies of their financial statements to their Canadian shareholders. . . In many cases the parent concerns publish their own statements in considerable detail in their own countries. It is not unreasonable, therefore, that Canadians should wish similar information about the activities of subsidiaries in this country. In the absense of such knowledge, suspicions are bound to be aroused, no matter how unjustified they may be.

- Sell an appreciable interest (perhaps 20% to

U.S. INVESTORS CONTROL 70% of Canada's oil industry. And operations there are often rugged, as photo shows.

25%) in the equity stock of larger Canadian subsidiaries to Canadian investors and include independent Canadians on the boards of directors of such subsidiaries.

While some companies have done this, and have said it has worked out well, the commission concedes that "material incentives" would be required before a majority of concerns would adopt such a policy.

One such incentive suggested for oil and gas companies would be to permit them "an allowance for depletion . . . on a more favorable basis than the present one. (Or that, alternatively, they should be charged with lower rate of tax on profits earned in the production side of their activities.)"

Granting of application for oil leases is the responsibility of the Canadian provinces, the commission also notes. It suggests that "provincial governments might well consider requiring foreign applicants for such rights in the future to incorporate under Canadian laws and to take Canadian partners. We suggest that the [Canadian] federal government take similar action with respect to the Northwest Territories and the Yukon."

Some independent oil operators in the U. S. also view U.S. support of Canadian oil and gas development with alarm—but for a different reason: They believe it poses a threat to domestic producers.

A decade ago Canada imported 38.5-million bbl. of U.S. crude; U.S. imports of Canadian crude were nonexistent. By 1956, Canadian imports of U.S. crude had dwindled to 6.2-million bbl., but U.S. imports of Canadian crude were up to 42.6-million bbl. (They represented 12.5% of all U.S. crude imports.)

A breakdown of Canadian crude exports shows that the U.S. is by all odds Canada's biggest crude export market. Last year, 19.2-million bbl. went to U.S. refineries in the Puget Sound area (via Trans Mountain Oil Pipe Line Co.). Another 18-million bbl. went to the U.S. Great Lakes area (via Interprovincial Pipeline Co.). Some 6.2-million bbl. went to the Vancouver marine terminal, most of this for tanker movement to California but some for foreign countries.

Inevitably, this trend is going to continue. Canadian natural gas is going to move to U.S. Pacific Coast markets via Westcoast Transmission Co. and Pacific Northwest Pipeline Corp. Tennessee Gas Transmission Co. wants to bring Canadian gas into the U.S. Midwest—and is being hotly opposed in hearings before the Federal Power Commission.

Forecasts are being made that the U.S. West Coast's dependence on Canadian crude, now amounting to 121,000 b. d, will increase to 420,000 b. d over the next decade.

But Canadian oil men—and the growing number of U.S. operators in Canada—don't agree that Canada's oil development threatens U.S. producers.

The Pacific Coast market, they point out, is growing for two reasons: expanding population, and gradually declining California crude production. Any Canadian crude moving into that area, therefore, is not supplanting domestic crude, they argue.

Canadian sales in the Great Lakes area might displace some U.S. crude, they concede. But the volume is small compared with U.S. imports of crude from other surplus crude-producing areas of the world.

And from the international defense standpoint, they say, crude oil resources in western Canada are just as essential to the U.S. as are crude reserves in Texas or Oklahoma.

Finally, they point to oil's tremendous value to Canada's position as an international trader. The Dominion's present unfavorable trade balance with the United States, amounting to about $1.5-billion annually, would be some $400-million more were it not for the extraordinary strides Canada has made toward self-sufficiency in oil, they maintain.

If no artificial impediments, in the form of higher tariffs or embargoes, are placed on U. S. imports of Canadian oil, there appears to be little question that Canadian oil will flow in increasing quantity to U.S. markets in the years ahead. And the availability of this market is all important in the development of the Canadian oil industry.

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"Training in public speaking is one means by which the employee becomes more confident. It helps him find new interest in his job. And the company becomes stronger because of his personal development."

K. W. Newerf
Community Relations Dept.
Richfield of Los Angeles

PUBLIC SPEAKING CLASS at Bakersfield (Calif.) production office of

Employee Self-Improvement Builds Up

Signs point to a flourishing of self-development among oil employees in the next few years. More and more oil companies are trying to speed the trend by making special training available. One of the best programs is the public speaking course offered to all employees by Richfield Oil Corp. (Los Angeles).

This month more than 400 employees are attending 16 different classes, scattered through company operations in six West Coast and Rocky Mountain states. The "students" represent a cross-section of company operations—production, refining, marketing, and home office. And it's significant that the appeal of special training has spread down through the ranks.

Explains K. W. Newerf, head of Richfield's Community Relations Dept. and director of the program: "Most of the participation is by people under the junior executive class. They are people who recognize the fact that they have some place to go, and make an effort to get there. About 80% are men. The reason for the lower number of women is that most of the girls in the company are secretaries and stenographers, who often lack the long-range view. About half of those attending are from the supervisory class. Almost all the rest are from lower levels, with not more than 15% executives."

Also significant is the high enrollment, despite the fact that no one is forced to take the speaking course.

The Richfield course typifies increasing efforts by oil companies to extend development training below the management ranks. Says the industrial relations chief of another major, "After the war we started our formal program to help managers improve—but now we're working down. Maybe we should abandon the whole business of strictly management development, and concentrate instead on personnel development."

This feeling is reflected in the public speaking courses already being sponsored by companies other than Richfield. Also in growing popularity across the industry are company classes in letter- and report-writing, conference leadership, work scheduling, and other subjects.

Sun Oil Co., for example, is encouraging its tankermen to "hit the books" on their own time while at sea. Last year 119 company crewmen studied everything from celestial navigation to the more complicated phases of marine engineering.

In addition, a Petroleum Week spot check shows that most majors are paying half to three-quarters of tuition costs for outside employee schooling. Representative is the company that refunds two-thirds of total tuition (to a maximum of $225 a year) upon completion of an approved, after-hours school, college, or correspondence course.

Dozens of subjects are approved for such study—including economics, languages, accounting, engineering, drafting.

Percentagewise, the number of employees taking advantage of tuition refunds today is not large. But the programs could be of great importance as the national interest in self-education continues to mount (page 88).

Richfield believes that its public speaking course enlarges both the employee's ability and work satisfaction—and at the same time strengthens the company. This is a conviction shared by the other oil companies pushing self-education.

Newerf outlines his company's view this way: "To begin with, the success of any organization is as dependent on the quality of its personnel as on the commodity or service in which it deals. If employees are industrious, conscientious, and capable representatives of a firm, that firm's supply, production, and marketing problems will automatically be solved.

"Training in public speaking is one means by which the employee becomes more confident. It helps him find new interest in his job. And the company becomes stronger because of his personal development."

Individual advancement is an important benefit for some of the employees who take part. "We had a man," Newerf recalls, "a chap with an excellent education, who had an evident horror of getting up and opening his mouth. A complete clam. He became one of our best speakers. Before, he was static in his position. Now he is moving ahead rapidly.

"Marketing personnel," Newerf observes, "are particularly benefited.

Richfield of Los Angeles. Stratigrapher explains his work to fellow workers.

Up to a Trend

However, there are very few employees in any department who don't belong to some organization, such as a church group or club. If they do, an ability to stand up and say something is going to put them ahead in their private lives, as well as in their work."

Newert adds, "Still another benefit is that men in the program have become known to company executives."

Bulk of the Richfield course consists of actual speaking practice before the group, plus evaluation by the instructor. After the initial orientation class, employees who volunteer are assigned five-minute talks, preferably on subject related to their work. Eventually, Newert hopes to circulate some of the speakers, on a voluntary basis, through the company.

A recent class innovation is the showing of ten-minute films on control of nervousness, motions, gestures, posture, and appearance. Also new is a twice-monthly company publication, The Speaker's Mirror, which goes to all enrollees. It carries news of progress being made in the various class units, plus suggestions on speech preparation and delivery. Sample advice: "If you say REK-ON-IZE . . . you had better practice the word until you can say REK-OG-NIZE."

Classes are held monthly. Each lasts two hours (from 5 to 7 p.m. or from 7 to 9 p.m.), usually in company facilities. If conference or coffee rooms are unavailable, the classes meet in hotel banquet rooms or elsewhere outside. The school year runs from February through November, skipping the July and August vacation months.

Richfield stimulates interest in the course by introducing competition and employee recognition—in addition to providing experienced public speakers as instructors (Larry Dysart and Richard Tunison).

"In contests at the final two classes," explains Newert, "Each group picks a speaker to represent it. Then we have a speak-off. Maybe the Southern Division will be paired off against the home office, or Long Beach production against the Watson refinery. We have a regular dinner meeting, with trophies presented by President Charles Jones, or one of the vice-presidents."

Class participation is noted in the company's personnel records. But no grades are marked. The purpose of the notation is to recognize devotion of time to self-improvement.

Employee reaction to the classes has been enthusiastic, and the program will be pushed indefinitely. Eight enrollees from Eugene, Ore., make a round trip of 250 mi. to attend the Portland course. Several men in the Sacramento group drive 55 mi. from Stockton and back.

Travel is on the employees' own time with no reimbursement for mileage.

Newert himself believes there is a high potential in such courses and the enthusiasm they generate. "We hope the public speaking classes will continue to grow," he says. "Eventually, we'd like to have every employee take part."

What's New
IN MANAGEMENT

Safety Brought Home

Standard of Ohio took off-the-job safety directly to 13,000 employee homes last week. It mailed a recorded personal safety message from President Clyde T. Foster, to be played on home record players. The mailing was a feature of last week's Sohio Safety Week—an attack on off-the-job accidents costing the oil industry roughly 10-million man-days a year.

Otto Haer, safety manager, believes this is the first time recorded messages have been used in a safety program. Other media used in Sohio's off-the-job safety campaign:

- A supervisor's kit, containing bulletin board posters, materials for use in personal contacts with workers, and a guide on ways to emphasize the campaign's objectives.
- A special publication, Sohio Safety News, with articles on off-the-job safety.
- Safety meetings and inspections.

Sohio's goal is to eliminate hazards and unsafe practices off the job.

•

A new slide rule is General American Oil Co. of Texas' quick answer to employees' questions about their share in benefit plans. It consists of a white card that is moved between two blue cards. The employee's salary and his share in two company benefits are on the white card. They are easily lined up with the required number of years on the blue cards. Retirement income is on one side, stock bonus on the other.

•

"Initiative is a must for any good manager," says the personnel chief of a Texas major, "but its real power comes when it's directed toward a study of the manager's own limitations."

The personnel man adds, "The man who doesn't know his own weaknesses can't go about improving himself. He may be the hardest worker in the company, but he may be wasting a lot of motion.

"The new emphasis on appraisal systems will catch a lot of misdirected effort. But the man who studies his own limitations, and works to correct them, will go the farthest."

DEPT/Refining

Key To Cleaner-Burning Gasolines?

New research, using radioactive tracers, has been able to determine which gasoline components leave the really harmful engine deposits.

Refiners' efforts to control deposit-forming tendencies of gasolines may take a new turn as a result of a study just completed by Esso Research & Engineering Co.

Probably the most important effect of combustion-chamber deposits is that they increase engine octane requirements. The higher-octane requirement is due to the low thermal conductivity of the deposits, which impede the flow of heat from the combustion chamber. Also, the chamber deposits act as uncontrolled sources of ignition.

The unsatisfied engine has a tendency to "knock," a condition which can be overcome by use of higher-octane gasoline. It is particularly true of today's near-100-octane premiums, since the octane numbers near 100 are worth more for knock suppression than are the lower octane numbers.

But with the increasing cost of making higher octanes, refiners feel it is more essential than ever to develop cleaner burning gasolines, in order to reduce engine octane requirements.

Much of the blame for such deposits has traditionally been borne by lead-based additives. However, a report made by Esso Research at last week's summer meeting of the Society of Automotive Engineers says that certain gasoline components also contribute significantly to engine deposits.

The moral of its study, says Esso Research: "To make a clean-burning gasoline, look to the bottoms. Keep the heavy materials out of the gasoline. It is now possible to make an exceptionally deposit-free gasoline simply by keeping a careful check on its hydrocarbon constituents."

Here are the findings on which that advice is based:

• The study shows that the deposit-forming tendency of hydrocarbons goes up strongly with increasing boiling point.

Esso Research made its tests on a leaded, highly-aromatic, full-boiling experimental gasoline, with a research octane number of 98 and a motor octane number of 87.5. The fuel had a hydrocarbon content of 34.8% aromatics, 26.1% olefins, and 39.1% saturates.

Here's how hydrocarbon boiling-point increases affected deposit formation: Isohexyl toluene, with a boiling point of 465F, had a deposit concentration ratio almost 14 times as great as toluene, which boils at 213F. Paraffins with a boiling point of 450F formed about four times as many deposits as paraffins with a 325F boiling point.

• Aromatics are reported to be "considerably worse deposit-formers than paraffins." Olefins are midway between the two.

This has been suspected for some time. However, the Esso report is the first to offer data on the magnitude of the differences. At a given boiling point, Esso researchers found, aromatics are nearly three times worse than paraffins in forming deposits.

Only one olefin was studied. It fell almost midway between the paraffins and the aromatics in deposit-forming tendency.

In the case of the aromatics, the tests found that deposit-forming tendency can be predicted from boiling point alone. Also, all carbon atoms in aromatic molecules are equivalent in tendency to form deposits. These facts lead Esso researchers to an educated guess on how the deposits are actually formed:

It now appears likely that hydrocarbon deposits form through condensation and carbonization.

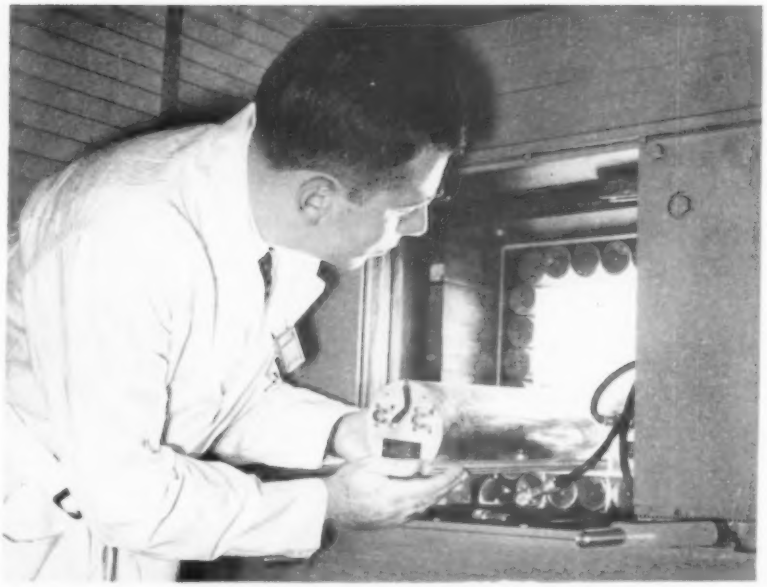
This theory would explain the strong effect boiling point apparently has on deposit formation, because the boiling point directly governs the tendency of a compound to liquefy.

However, the theory does leave questions unanswered, and Esso Research scientists call it only "probably substantially correct."

Reduction of hydrocarbon deposits can also lower the amount of lead salts left in engines by gasoline additives. This was shown true when a gasoline with less tendency to form deposits (one with an increased iso-octane content) was substituted for the original fuel. Here's how Esso Research describes the result:

"Even though the same amount of lead passed through the engine in both tests, there was much less [lead] present in the deposits when isooctane was the fuel. This indicates that the carbonaceous part of the deposit is important not only in itself, but also because it acts as a matrix to which the lead adheres.

"It is quite possible that if the



RADIOACTIVE TRACERS, inside the cylinder, are placed in a special test engine at Esso Research Center, Linden, N.J., to study causes of engine deposits.

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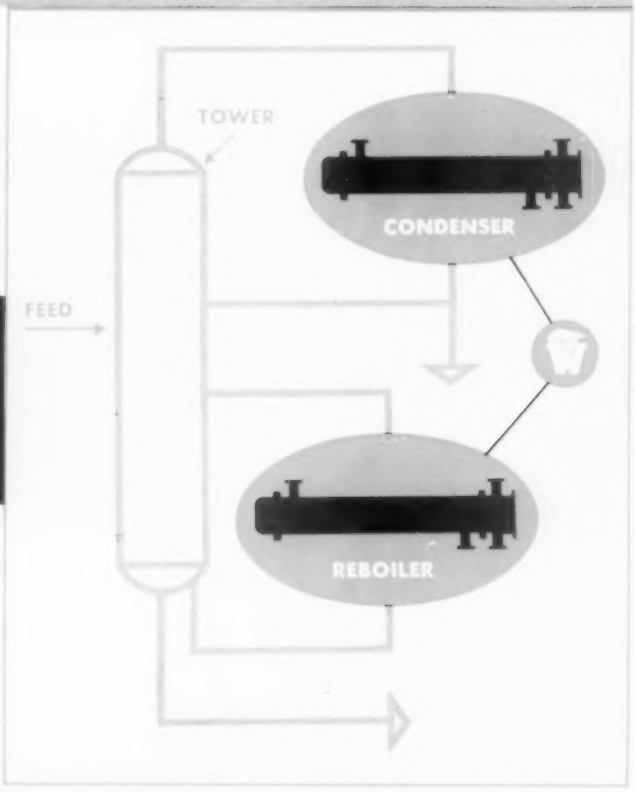

Increased on-stream time and flexibility of operation up to an increased capacity of 80% were the startling results realized in a Gulf Coast refinery when a 1500-tube debutanizer reboiler was retubed with Wolverine Trufin Type S/T tube.

The increased capacity obtained in this retubed unit, during the seven months it has been on-stream, is just another example of the performance records Trufin Type S/T is helping establish throughout the processing industry.

There is nothing mysterious about Trufin's ability to outperform prime surface tube. The reason for its outstanding success is found in its extended surface—integral fins squeezed directly from the tube wall.

Because of this greater surface area, Wolverine Trufin Type S/T transfers more BTU's per foot of tube. You pack more heat transfer surface into existing units and, if designing new equipment, come up with smaller, more effective units that save space and reduce costs.

Trufin-tubed units also lengthen on-stream time. Its extensive use has proved that Trufin resists accumulation of fouling deposits—gives heat exchangers longer maintenance-free operating periods than prime surface tube. Its integral fins are unaffected by vibration, temperature changes or pressure variations.

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carbonaceous part of the deposit could be eliminated, the entire deposit might disappear. It is apparent from this that an improvement in the deposit-forming properties of the gasoline hydrocarbons would be of great value in all aspects of engine performance affected by combustion-chamber deposits."

Radioactive tracers were instrumental in the analyses the various gasoline components.

Esso Research calls this project the first use of radiation for studying causes of deposits in auto engines.

Researchers at the Linden (N.J.) Esso Research Center have been working on these experiments for 2½ years. Tests have centered about the addition of minute quantities of radioactive compounds to gasoline, after which a special test engine is run on this fuel (picture, page 62).

By analysing the radioactivity of the deposits formed in the engine, the researchers determined which gasoline components were the culprits and which were harmless.

There are several advantages of this method, according to Esso Research:

- It measures the deposit-forming tendency of a component in the concentration in which that component actually is present in the gasoline. The gasoline is not unbalanced by addition of large amounts of the material to be studied. In the radiotracer technique, the labeled material is added in such small amounts that the concentration of the component is unaffected.
- It is possible, by varying the position of the labeled carbon atom, to differentiate not only among compounds but even among carbon atoms in the same molecule.
- The results are expressed directly as deposit-forming tendency and not as some other property from which this tendency must be inferred.
- The test is reproducible.

Formerly, research on hydrocarbon deposit-forming tendencies had been of two kinds: (1) pure compounds were studied, or (2) selected refinery streams were blended to make the test fuels.

However, the first method gives results which may bear no relationship to what happens when a commercial fuel is used; and the second method gives results which are almost impossible to interpret, because of the complexity of even the most carefully-controlled refinery stream.

Esso Research sums up the shortcomings of these methods this way: "The first method is too simple, and the second too complex."

Largest Gas Plant Coming

Humble Oil & Refining Co. will build the world's largest gas processing and cycling plant in the Corpus Christi area late next year.

The plant is expected to cost $75-million, and will have a processing capacity of 750-million cu. ft. of gas per day.

It will be designed to recover 25,000 b d of liquid products, consisting primarily of propane, butanes, and a mixture of heavier natural gas liquids.

Most of the products will be shipped to southwestern markets by pipeline, although facilities for loading tank cars and tank trucks will also be built.

The exact location of the plant is still up in the air. Most likely sites include the Kingsville-Bishop area and the Alice area.

An extensive pipeline gathering system and transmission line is being planned to deliver gas produced by Humble in Kleberg, Jim Wells, Brooks, Duval, Kennedy, Jim Hogg, and Nueces counties to industrial customers in the Houston area.

All of those counties are in the Corpus Christi-Laredo area of Texas, where a big jump in drilling for natural gas is expected to hit shortly (page 28).

Humble's existing Calallen Gas Pipeline System, which supplies industrial customers in the Corpus Christi area, will also be connected to the proposed plant.

Actually, a great part of the gas will come from Humble's holdings on the King Ranch, where many of the company's wells have been shut in for years.

Humble leased 1-million acres there back in the 1930s. Since then, oil and gas development on the ranch has been rapid.

For the past 15 years, however, Humble has capped the bulk of its gas producers on the ranch because of a lack of pipeline connections and a suitable market for gas. The new pipeline system and Houston-Baytown-Beaumont industrial customers will change all that.

To date, Humble's Katy plant, west of Houston, is the world's largest gas processing plant, with a daily capacity of 550-million cu. ft. of gas.

Pan American Petroleum Corp. has the world's second largest natural gas plant near Old Ocean, Tex.

The plant has a daily capacity of 550-million cu. ft.

La Gloria Oil & Gas Co.'s Falfurrias (Tex.) plant, third largest, with a capacity of 300-million cu. ft. daily, is now being expanded (PW—Feb.13 '57,p60).

The Giant plant runs counter to the trend that has been shaping up in natural gas plant construction, toward smaller, more-automated plants (PW—Apr.1'57,p41).

Humble, with its tremendous gas reserves, and extensive pipeline facilities is hardly in the position of most other gas producers. With the growing demand for gas, many smaller producers have found it more profitable to sell to pipeline buyers. So more stripping plants are becoming a necessity.

Rigid Polyethylene Is Going Latin

The rush to market rigid polyethylene is spreading south of the border.

Rigid polyethylene—a newer version of the waxy, flexible plastic used in a wide variety of products—is only now coming on the U. S. market in quantity.

Phillips Chemical Co., which owns one of the several processes for production of this high-density resin, recently put into production a 75-million-lb.-a-year plant it has on the Houston Ship Channel.

Petroleos Mexicanos, the Mexican government oil monopoly, is said to have completed a deal to use the Phillips Chemical Co. process in that country's first polyethylene plant. The plant will be built adjacent to Pemex's 100,000 b d Atzcapoltzalco (Mexico City) refinery.

The Phillips process converts ethylene to polyethylene with a catalytic method under low pressure.

The plant will reportedly have a 15-million-lb.-a-year capacity, and will be in operation in 1959.

It will get its raw materials, mostly ethylene, from the Atzcapoltzalco refinery.

The current market for polyethylene in Mexico is estimated at between 2,500 and 2,700 metric tons annually. By 1960, the Mexican market is expected to consume about 4,000 tons a year.

The Brazilian licensee of the Phillips process is bringing its polyethylene plant on stream.

The firm, Electro-Cloro, is now ready to begin operations at its plant in Sao Paulo.

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Treco has purchased a tract of land, in excess of three acres. This new facility provides more than 14,000 square feet of air-conditioned offices with paved parking for over 200 cars. There is also a cafeteria building and two other buildings of 9,700 feet and 37,000 feet of space for expanding Treco activities.

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What's New / IN REFINING

The Texas Co. has just begun construction of its nuclear radiation laboratories at Beacon, N.Y.

The facility—"one of the world's largest and most fully-equipped radiation laboratories"—is expected to be completed by next April. It is the latest of several recent additions to major oil company nuclear-radiation research facilities (PW—Apr.19'57, p50).

Frederic H. Holmes, vice-president of Texaco's research and technical department, says the lab "will increase our radioisotope investigations that bear on day-to-day problems in the use of lubricants and fuels. Our researchers hope to enlarge their understanding of how greases and oil lubricate, how wear and corrosion occur, why certain jet fuels are better than others, and other related problems."

•

Ethyl Corp. has developed two new instruments which, when used together, provide accurate measurement of friction inside an operating car engine.

In the past, losses in engine efficiency through friction have been measured only in "rough" terms.

One instrument—a specially designed balanced-pressure indicator—compares pressure inside an engine cylinder with known reference pressure.

Then an "average-cycle counter" averages the variations in peak cylinder pressure to crank angle time in the operating cycle. These data make it possible to calculate the extent of engine friction.

The ability to measure true engine friction is expected to help designers when studying fuel economy of future engines.

•

The first all-hydraulic control system for operating product valves is now in use at the new Texas Butadiene & Chemical Co. plant near Houston (PW—Apr.26'57,p65).

The hydraulic system runs on a 50-hp. central power unit. The system, designed and built by Rivett, Inc., Boston, controls some 98 gate valves.

•

Ben Franklin Refining Co. will build a 1,000 b/d hydrofluoric alkylation plant at its Ardmore (Okla.) refinery.

Refinery Engineering Co. of Tulsa will build the plant under license from Universal Oil Products Co. Construction will start later this year. Ben Franklin is a wholly-owned subsidiary of Bell Oil & Gas Co.

•

Standard Vacuum Oil Co. plans to increase the capacity of its Trombay (India) refinery by 5,000 b/d, to 33,000 b/d.

The five-year expansion will cost $10.6-million.

In addition to increasing kerosine production, Stanvac will install units for manufacture of asphalt, LP-Gas, solvents, jute batching oil, and aviation turbine fuel at Trombay.

Stanvac estimates that the expansion plan will save India about $2½-million annually now spent in importing these products.

•

United Refining Co. has just put a fluid cat cracker, a gas concentration unit, and a polymerization plant on stream at its Warren (Pa.) refinery.

The cat cracker, licensed and designed by Universal Oil Products Co., has a feed capacity of 2,500 b/d. Designed to operate at 75% conversion, the unit produces a gasoline of 98 octane (leaded).

UOP also licensed and designed the other two units.

•

A pharmaceutical firm says it has developed molds which can "cause chemical changes in petroleum."

Chas. Pfizer & Co. made this claim last week. Additional information on the molds, however, was not made available. The Brooklyn (N. Y.) firm also says that it is considering entering the petrochemical field.

•

Aronow Refinery Co.'s small Kalispell (Mont.) refinery is coming back on stream to make jet fuel.

The plant, which has been idle for four years, will run a maximum of 1,000 b/d of crude. It will produce no gasoline this summer, concentrating instead on a high jet fuel yield.

The fuel will be used by Air Force jets.

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Bolivia Wants More U.S. Oil Aid

Four U.S. companies were getting set to move into oil development in southeastern Bolivia last week—and a fifth was being sought by Bolivia's government oil company to develop still more of its acreage there. (PW—June7'57,p6).

The deals involve contracts with Yacimientos Petroliferos Fiscales Bolivianos in the country's sole present oil-producing zone. Rights there are reserved to the government company by Bolivia's petroleum code. Other regions are open to private companies for outright concessions from the government.

YPFB, however, is free to get all the help it can from private capital in developing its acreage, with the specific approval of the government. Bolivian Gulf Oil is the only company that has acquired actual concession rights in the YPFB zone, in return for helping to finance a projected pipeline to the Chilean coast.

The four companies that announced a move toward this area last week are: Tennessee Gas Transmission, Union Oil & Gas Corp. of Louisiana, Lion Oil, and Murphy Corp.

The group, which last year acquired concession interests in Venezuela, is actively seeking further oil lands abroad through the T.U.L.M. Corp., which was formed for the purpose earlier this year.

The T.U.L.M. group obtained an option from the Bolivian government to take over acreage which Glenn McCarthy held under contract from YPFB.

According to an announcement made by Tennessee Gas, the deal covers about 900,000 acres "formerly" held by McCarthy.

McCarthy recently had signed a new 35-year contract with YPFB, which made a 25% reduction in a 1952 contract covering 970,000 acres at Los Monos and Agua Salada (PW—Mar. 29'57,p37).

Up to that point, McCarthy had drilled some four wells but had encountered financing difficulties that delayed further development.

The substitute contract specified that McCarthy would have to start drilling by mid-May, with a minimum of $5-million capital. The announcement of the new group's option did not specify whether McCarthy had failed to meet these obligations.

If the group exercises its option, it will pay McCarthy and his companies under a contingent contract for all equipment they had in Bolivia, and for all their rights in the tracts involved.

The T.U.L.M. group will pay McCarthy $1½-million in cash, and a like amount out of future production payments, as well.

YPFB will get an undisclosed amount in advance royalties and taxes from the group when the contract becomes effective.

Operator in the venture will be Chaco Petroleum, S.A., a newly formed subsidiary of Tennessee Gas, which will hold 35% interest in the deal.

Union Oil & Gas and Lion Oil reportedly will have 25% each, and Murphy Corp. 15%.

Now YPFB is looking for a U.S. partner for a 35-year joint development contract on 108,186 acres just south of the T.U.L.M. acreage, bordering the Argentine frontier.

U.S. oil companies were asked last week to submit bids to YPFB in La Paz by July 15. The winning bidder will be selected within ten days.

Terms for this contract are outlined in Bolivian government Decree No. 04645, dated May 15.

As announced in Washington by YPFB representative German Rovira, the contract requires the U.S. partner to deliver a percentage of gross crude and gas production from the acreage to YPFB, in return for complete exemption from all government taxes. Otherwise, the company will have full exploration and development rights as set forth in Bolivia's petroleum code.

Joint Lake Facilities Will Cut Costs

CARACAS—Fast-expanding activity in Lake Maracaibo, and the prospect of heavy outlays for new shore installations and transport facilities, are bringing oil and service companies together as participants in Venezuela's first collective service venture (PW—June7'57,p14).

Terminales Maracaibo, C.A., is a new $24-million company that is still in the process of formation by a wide variety of oil industry and business interests. The company is gearing for an immediate start on providing the joint terminal and fleet facilities needed for producers, drilling contractors, construction firms, and other service companies.

The aim of Terminales Maracaibo is to reduce individual expenditures of oil and service companies.

- It will provide joint terminals and shore installations which the companies would otherwise have to build separately.
- It will provide space for individual installations of participating companies, in addition to joint facilities at the terminals.
- It will make available barges, tugs, supply boats, and other craft needed by companies only on a part-time basis.
- It will integrate operations of boats, such as personnel launches,

which can be used jointly by as many as eight or ten companies that supply services to a single well.

To achieve this aim, the company has acquired two terminal sites on the eastern lakeshore, a fleet operation, and a drydock, for a start.

Cia. Shell de Venezuela has agreed to turn over 185 acres of land at Pueblo Viejo and 70 acres at Las Morochas, in exchange for stock in Terminales Maracaibo. The new firm plans to build docks and boat basins there, and to furnish space for warehouses, shops, and industrial installations.

In addition, Shell has leased another 170 acres at Pueblo Viejo to Raymond Concrete Pile Co., Brown & Root, and Schlumberger for installations that will be integrated with the new terminal and industrial area. Shell will probably make available additional land if needed for later expansion.

Terminales Maracaibo will also absorb two existing service companies. One is Maracaibo Towing Co., the biggest independent fleet operator on the lake. Valued at $7.8-million, this company also builds lake drilling platforms under contract. Its fleet includes 44 heavy units, such as launches, tugs, barges, and crane-barges.

The other company being absorbed is Dique Seco de Maracaibo (DISEMA), a $1.2-million company, which operates the lake's newest drydock, built last year.

Terminales Maracaibo will operate on the basis of user fees for marine equipment, docks, and basins, and long-term rentals for terminal space.

The two jointly-used terminals will help solve the problem of a shortage of adequate sites on the swampy lakeshore. Available space there is further restricted by Shell's producing operations in a long coastal strip. Pueblo Viejo is located well to the south, opposite new lake concessions where drilling will be concentrated.

The company also plans housing developments for workers, to be built from 4 to 8 mi. inland from the terminals, on higher, healthier ground.

Plans are being drawn up by Oficina Tecnica Bernardo Nouel-Ingenieros, C.A., Caracas engineering firm, and Dr. Gustavo Ferrero, leading urban designer.

Shares in the new company are already oversubscribed. Purchasers include several of the newcomers among oil operators on the lake, as well as service and construction firms.

San Jacinto, Signal, Pure Oil, Hancock, and Sohio have already bought in, to avoid heavy outlays for building separate terminals and acquiring their own fleets, especially while operations are in an early stage.

Other firms that have subscribed to shares or are completing arrangements to take part in the venture include: Schlumberger, Halliburton, Raymond Concrete Pile, Brown & Root, Chicago Bridge & Iron, Servicios Hydrocarb, Petro-Tech Service, Frederick Snare, and United Oilwell Service.

A public offering of around 36% of the capital shares was heavily oversubscribed. The rest is committed to the participating companies, to institutional investors, and to part payment for Maracaibo Towing and DISEMA.

Terminales Maracaibo plans to start construction in July at Las Morochas on a 2,500-ft. L-shaped pier.

Halliburton is expected to install cement silos on the pier. United Oilwell is already located at Las Morochas, and Servicios Hydrocarb also will set up installations there.

Some contracts have already been signed for installations at Pueblo Viejo, and others are in the offing.

Raymond Concrete Pile will build a concrete pile yard there, and Brown & Root and Schlumberger also have signed contracts for installations.

Chicago Bridge & Iron is expected to install tank making facilities, and Rosson Richards likewise may install permanent pipe-coating facilities.

Terminales Maracaibo's own initial investment in this first attempt to provide integrated fleet and terminal facilities on the lake will total $12.9-million.

This breaks down to an estimated $4.8-million for construction of docks, basins, and loading facilities; $2.1-million for development of streets, electricity, water, and other services; and $6-million to be spent immediately for new marine equipment, including additional light and heavy tugs, multiple-purpose barges, and crane barges. Helicopters will be purchased eventually.

Directors of Terminales Maracaibo include Arthur A. (Duke) Curtice, president of Signal Exploration Co. and a director of United Oilwell.

The others are: John Kalimnios, founder and head of Maracaibo Towing Co.; Juan Mendiri, president of DISEMA; Mario Belloso, president of the Hotel del Lago; Robert Bottome, of the Caracas brokerage house bearing his name; Robert Ford, Schlumberger's general manager in Venezuela; Andres Boulton, head of H. L. Boulton & Co., agents for Grace Line and other shipping firms; Otto Gerstl, an official of the same company and other Caracas firms; and Warren Hall, consultant to oilfield service companies and a director of other firms.

What's New

Iraq Rules Out Pipeline Discussion

MIDDLE EAST—Iraq, a key nation in the projected new Mideast pipeline network, made it plain last week that it considers the routing of Iraqi oil its own business.

The Iraqi government issued an official denial of reports in the Middle East that the Baghdad Pact nations would discuss the network that would carry Iraqi and Iranian oil through Turkey to the Mediterranean.

Iraq, Iran, and Turkey, with Pakistan and Britain, are members of the Baghdad Pact, whose Ministerial Council opened its third annual meeting in Karachi last week.

"The Iraq government hereby announces," said the communique, "that Iraq's oil has nothing to do with the Baghdad Pact—or any other pact.

"Iraq alone will dispose of its oil according to its own interests. Therefore no discussion can take place on the question in Karachi."

Indirectly, this indicates Iraqi authorities are standing firm on their preference for an all-Arab route for the new pipeline—at least while there is still hope for securing adequate security guarantees from their Arab neighbors.

In Cairo, meanwhile, no mention of pipelines was made in the final communique issued by the Arab League's Economic Council (PW—Jun.7'57,p48). It repeated the council's earlier recommendation that member nations form an Arab tanker fleet and added others to encourage cooperation in improving distribution of refined products in Arab lands.

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New Boycott Office?

DAMASCUS—The Arab League is aiming to set up a regional Israel boycott office in the Persian Gulf with headquarters in Kuwait, a major Middle East oil producer which is not a member of the league.

Dr. Abdul Karim el Aydi, director of the League's Damascus-based Central Bureau for the Boycott of Israel, has gone to Kuwait to discuss establishment of the bureau there. He was accompanied by Tahir Salman, director of the boycott office in Baghdad.

Dr. Aydi is reportedly also seeking the sheikhdom's cooperation in pre-

venting shipments of any Kuwait crude oil to Israel. Gulf Oil and British Petroleum are the concession holders in the British-protected sheikhdom.

Although Kuwait, like other Persian Gulf sheikhdoms, is not a member of the Arab League, its rulers have promised to go along with league decisions in matters concerned with the economic boycott of Israel.

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A Shadow in Sicily?

SICILY—The Italian government's Ente Nazionale Idrocarburi, which has a preferential oil development position on mainland Italy, is apparently set to gain a similar position in Sicily under a proposed partnership with the regional government.

Sicily's regional president announced last week that a 446,329-acre exploration concession will be granted to a new company to be set up in Sicily by ENI.

Under the ENI proposal, the Sicilian government would get 25% interest in the new company after production is established.

Minor details remain to be settled before the agreement is signed.

If it goes through, the Sicilian government's entry into the oil business may foreshadow the first limitations on expansion of private oil company operations in Sicily. Heretofore the regional oil law has encouraged private enterprise. ENI has been free to operate there, but on an equal footing with private companies.

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Venezuela's fast-expanding, oil-financed economy has made it a $1-billion-plus customer for U.S. goods and services, the biggest in South America.

According to a new study prepared by Econometric Specialists Inc. for Creole Petroleum Corp., the total value of U.S. exports to Venezuela is now running at the annual rate of $1,150-million. This includes some $650-million worth of commodity trade and an estimated $500-million in invisible exports of services. The total represents a 5,000% increase in U.S. exports to Venezuela in the past 21 years.

The research organization in 1954 did a state-by-state survey of the sources of U.S. exports to Venezuela for Creole in 1954. The report released last week related official 1956 commodity trade statistics with the data gathered two years earlier.

Comparing its findings, Econometric Specialists reports that:

- The value of merchandise exports rose by $417-million, or 22%.
- The value of exports increased in nine of the 11 major export commodity groups classified by the U.S. Dept. of Commerce.
- Some 29 U. S. states benefited from the increased value of the exports. The ten leading states in value of 1956 exports to Venezuela were: New York, $58.1-million; Michigan, $48.6-million; Ohio, $41-million; New Jersey, $40.8-million; Pennsylvania, $34.7-million; Illinois, $20.4-million; California, $12.3-million; Indiana, $12-million; Wisconsin, $10.7-million; and Texas, $8.5-million.

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BRUNEI—Royal Dutch Shell is giving up its effort to find an extension of the prolific Seria field 25 mi. out in the China Sea, off the coast of this sultanate in British Borneo.

Shell Petroleum Co. announced last week that it is abandoning the Ampa Patches location, a coral reef in 30 ft. of water where it started drilling from a fixed platform last November. The well was carried to 6,000 ft.

Shell said drilling equipment will be transferred to Siwa, a location 60 mi. to the southwest, where a second fixed platform was set up recently in 75 ft. of water. This site is 8 mi. off the coast of the neighboring British colony of Sarawak.

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PAKISTAN—Sun Oil Co. is set to extend its expanding foreign exploration activity into 10,000 sq. mi. of acreage in West Pakistan.

Under a concession agreement signed this week, the Pakistan government will share 25% in the initial exploration and development costs of five concessions in the south and southwest. Sun Oil expects to put two geological crews to work on the acreage during the first year.

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ALGERIA—French hopes for their Hassi Messaoud oil find were boosted another peg last week with word that a second extension well had reached the pay zone at a location about 6 mi. southwest of the Sahara discovery well (PW—Apr.12'57,p56).

The well, MD-2, entered the pay sands at 11,024 ft., apparently at a deeper level than the 460 ft. pay zone found in the MD-1 discovery, the biggest in the Sahara to date.

About 4 mi. north of MD-1, drilling is being continued on OM-1, the first extension well. This entered pay zone in mid-May at 10,728 ft. and had drilled through 328 ft. of pay sands as of last week. A third extension, MD-3, is now being drilled about midway between OM-1 and MD-1.

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CARACAS—Venezuela's Minister of Mines & Hydrocarbons has unleashed a scornful denunciation of oil concession "intermediaries"—and an implied warning to concession seekers to steer clear of them.

In his annual report to Congress, Dr. Edmundo Luongo Cabello lashed out at concession-peddling attempts made during the past year by persons who had obtained verbal awards only to sell them.

"Those absurd intermediaries who aspire to re-sell (if we may use the term) the verbal award—which they necessarily obtained by making the highest offer—do not have the connivance of the government," the minister said. "To the contrary, they are disqualified in the opinion of the government, since they show that they have neither vocation nor passion for the oil business."

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IRAQ—Iraq Petroleum Co. will step up its crude oil flow to the Mediterranean to 280,000 b/d by installing new temporary pumping equipment at its sabotaged T-3 pump station in Syria.

An IPC spokesman in London said plans call for eventual restoration of the pre-crisis flow of 500,000 b/d through its pipelines from northern Iraq. The rate of throughput has been 210,000 b/d since March, when oil exports were resumed.

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VENEZUELA—Gas utilization in eastern Venezuela has started the sharp climb anticipated this year with inauguration of a big new pressure-maintenance and gas-conservation plant at San Joaquin, in Anzoategui.

The new $2.1-million plant was built jointly by Creole, Mene Grande, and Socony. It will inject a daily 45-million cu. ft. of gas into two reservoirs in the Greater Anaco area. The plant operates with six 660-hp. compressors and injects gas into eight wells. The plant is one of the biggest in eastern Venezuela, where several more installations will be completed this year.

DEPT/Marketing

Independent Refiners Turn to Brands

- **Southwest independent refiners are turning to branded operations to help stabilize sales.**
- **A big push in this direction could bring widely felt changes to Southeast and Gulf Coast markets.**

Independent refiners in the Southwest—faced with shrinking markets—are getting ready to move into the retail field with brands of their own, reports National Petroleum News, McGraw-Hill magazine of oil marketing.

There are about a dozen independent refiners on the Texas Gulf Coast, and about a half-dozen in Louisiana.

Competition for gasoline markets is tougher than ever today, everywhere. It's especially hard on these independent refiners. As a result, they're looking hard for markets that they can count on month after month, instead of just day-to-day, says NPN.

A growing number of independent refiners on the Texas-Louisiana coast are becoming brand-conscious in one way or another. Some are expanding previously limited retail operations. Others are setting up new retail facilities, or getting ready to do so soon.

A big push to brand retailing by independent refiners in the Southwest, says NPN, could bring widely felt changes in Southeast and Gulf Coast markets.

Texas Gas Corp.—the latest to join the brand trend—is emphasizing gasoline quality to spread customer and jobber confidence in its new brand.

Texas Gas has a refinery at Winnie, Tex., about 50 mi. from its Houston headquarters.

The company has been easing into the Texas coastal marketing picture for five years, says NPN. For a while, it sold unbranded products to barge and cargo buyers, then concentrated on truck transport buyers between Beaumont and Houston. In January, the company started putting up its own pump globes and "Platinum" brand signs at independent stations.

The plant at Winnie can now put out six grades of gasoline, with a top grade of 100-octane. Texas Gas plans a big local ad campaign soon to announce its aim of establishing its own brand.

The company is backing up its advertising push with extra customer service. Test samples are taken frequently from the company's branded stations to keep close quality control. The sales staff visits stations often and checks through on customer complaints about "knocking." If gasoline quality is known to be up to par, they offer to check the customer's car for mechanical difficulties.

This approach is partly aimed at showing station men and jobbers how dedicated the company is in its goal of building a quality brand.

Texas Gas' move into the branded retail field hasn't created any big stir, so far, because it's still a newcomer and relatively small. The company hasn't any set timetable for getting branded jobbers, either.

"Right now we're trying to hold on to the business we have," says Roger McKillip, sales manager. "That's our primary reason for going branded. Eventually, we believe that by establishing a brand that will be recognized for quality, we can interest plenty of jobbers."

Gulf Coast marketers are keeping a close watch on Eastern States Petroleum Corp. A move to branded operations by this company could lead the way for other independents.

Eastern States, with its modern 65,000 b/d refinery in Houston, would offer formidable competition. The company reportedly has already chosen a station design and made market surveys. It is said to have earmarked $6-million for its brand project.

Other independents are nearing a decision. Delhi-Taylor, of Corpus Christi, is contemplating a move into the Middle Atlantic area, and has purchased a terminal at Charleston, S. C.

Crown Central Petroleum is stepping up its retail operations in Houston, where it has a 35,000 b/d refinery.

Ingram Products Co., with a 10,000 b/d refinery near New Orleans, has been selling its own brand along the Louisiana coast for two years.

In addition, American Oil Co. of Texas, a wholly-owned subsidiary of American Oil Co., has been building and acquiring outlets in Texas City and Houston. Since American is one of the Standard Oil Co. (Ind.) group, this could be a part of Standard's move to the West (PW—Jan.6'56,p56).

If enough independent refiners establish branded outlets, there'll be hard bidding by refiners to line up more and better jobbers.

Most independent refiners agree that it will take time and money to put the brands across. Private brand distributors will remain the choice customers for a few years.

The more jobberships an independent refiner can line up, the easier it will be to win acceptance of a new brand.

Texas Gas, so far, hasn't offered price incentives or anything, except its brand name, to jobbers. However, there are jobber aids on the horizon. The company hopes to have its own credit card system, and is working on a new station design that jobbers can use.

"So far, we haven't been able to offer financial aid to jobbers or even paint for their stations," says McKillip. "We are too small to talk about financing anybody. But I'm sure we will be offering other services soon."

The growth of refiners brands also has its gloomy aspects. It may mean cut-throat competition and new gasoline price wars.

Heavy merchandising programs will be a part of the brand moves. The independent refiner will probably try selling cheaper than majors, at least until he gets established, says NPN. If majors retaliate with a price drop, retail gasoline price wars are inevitable.

Recent refinery expansions by majors have taken away many of the independents' major company customers. Independents hope that branded operations will help preserve and extend an assured products market.

The government's fast tax writeoff policy has encouraged major companies to increase refinery capacities. Most refiners can't resist using the costly equipment, so gasoline supplies are plentiful.

One independent refiner explains his dilemma this way: "Major companies have become too self-sufficient. They used to have to depend on us to supplement their own products output. They still do, to some extent, but not the way they did a few years ago."

Bargain-hunting by private-brand-

ers adds to the uncertainty of the markets and keeps refiners off balance.

Along the Gulf Coast, there's a heavy concentration of private-brand distributors of all sizes. Some are known as dependable customers, others aren't.

"We never know when we have one of these operators on our books, and when we don't," says one independent refinery sales manager. "If they get a cheaper price from another supplier, they . . . either start trying to beat our price down, or they just don't show up. When they don't show up, then you know you no longer have a customer."

Competition from new Canadian and Midwest refiners is luring some customers away from Southwest independents, too, the NPN report says.

The growth in Canada's refining industry has been a minor contribution to the market slump, say independents. While they didn't produce directly for Canadian markets, they did sell to brokers who supplied Canada. Now those sales are few and far between.

New plants along the Upper Mississippi are on full stream, supplied by lower-priced Rocky Mountain crude. This can price Texas independent refiners right out of that market, says NPN.

What's New / IN MARKETING

A staff report on the recent Roosevelt hearings—which proposes specific actions to eliminate alleged "wrong" practices in oil marketing—is under study by the House small business subcommittee.

The report recommends immediate enactment of only one bill, HR-432. This would pay dealers' legal costs in injunction suits against suppliers.

More study is recommended for the so-called "divorcement" bill, which industry spokesmen opposed vigorously in the hearings (PW—Apr.26'57, p68). Rep. James Roosevelt (D., Calif.), subcommittee chairman, last week indicated that even he considered the divorcement bill "drastic legislation."

The report also levels several complaints against the industry. It advocates specific actions by suppliers, as well as state and federal governments.

The subcommittee has not yet decided whether or not to accept the report.

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Oil heat men were told last week that their industry "faces suicide" unless some changes are made. George Hochstein, outgoing president of the Oil Heat Institute of America, delivered the warning at the OHI meeting in Boston.

Hochstein said that the industry will move ahead only when problems of below-par installations and below-par service are solved.

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The potential test-case on labeling of re-refined products has just finished round one of a bout that may go all the way to the Supreme Court. Federal Trade Commission Examiner J. Earl Cox last week ruled that Mohawk Refining Corp., Newark, N. J., must label its re-refined oil products as such.

Cox says that retailers and the public prefer virgin oils, and they are "entitled to get what they choose, though the choice may be dictated by . . . fashion, or perhaps by ignorance."

Mohawk claims that its re-refined oil meets all the standards of virgin oil. The company maintains that public interest doesn't require labeling of re-refined oils, unless all oils are required to be identified as to specifications.

Mohawk will now appeal the ruling to the full commission, and has indicated it will appeal to the U.S. Supreme Court if necessary.

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Various segments of the oil industry should just "bury the hatchet—not bury it in each others' heads," says Robert H. Scholl, vice-president of Esso Standard Oil Co.

Scholl told the Louisiana Oil Marketers Assn. that the economic facts justifying recent crude and product price increases were known throughout the industry. This, he says, makes it all the more strange that some of the most bitter attacks came from within the oil industry.

"With oil men themselves calling oil men names, even the soundest and most logical explanations may not be accepted by the public," Scholl told the marketers' group.

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Industry's Microwave Use At Stake

Oil and gas firms, biggest users of microwave radio, are fighting in Washington to keep—and expand—private systems rather than be forced to turn to common carriers.

The oil industry wants to quadruple its investment in microwave radio facilities over the next ten years. In fact, the industry may need more than 6½ times as much microwave beam mileage as it now owns, W. M. Rust, Jr., Houston, told the Federal Communications Commission last week. Rust is assistant chief geophysicist for Humble Oil & Refining Co.

He based his estimates on information supplied to him by 93 companies in the oil and gas business.

Right now, he says, the industry operates 730 microwave stations, covering a total of 17,000 beam mi.

A microwave beam is usually split into several channels. The present beam mileage is equivalent to about 30% of the total channel mileage in the industry's communications set-up. This now includes almost 268,000 channel mi. of company-owned wireline, and almost 151,000 channel mi. of leased wireline.

By 1966, according to Rust, the oil industry will require from 70,000 to 114,000 beam mi. of microwave facilities.

But the whole future of private microwave—including the oil industry's second-to-none investment—is in doubt.

The Federal Communications Commission began licensing space in the microwave range, for commercial use, right after World War II. Since then, oil and gas companies have become the biggest microwave users.

Common carrier communications companies, such as Western Union and companies in the Bell system, have become the oil industry's primary competitors for frequency assignments. And, in recent years, other industries have joined the scramble for radio space.

All licenses to private users, however, have been on a "temporary" basis. By next year, these licenses are expected to be recalled.

After a decade of doling out microwave radio space for both public and private systems, the Federal Communications Commission is now trying to decide whether the spectrum is big enough for both types.

The commission is holding a series of hearings to find out how big the microwave interest is among private industries, the extent to which each industry's interest coincides with public interest, and which private industries, if any, should be permitted to use microwave on a "permanent" license basis.

FCC is expected to act on this early in 1958.

Common carriers, already assured of continued access to the microwave range, have taken the position that no private licenses are necessary (PW—Jun.29,56,p28).

During the next week or so, FCC will be hearing from the independent telephone companies, A.T.&T., and other common carriers. After that, it will hear from railroads, truckers, spokesmen for steel and other manufacturers, and even from radio astronomers. (Municipal police and fire departments, plus taxicab operators and some trucking and shipping groups, have presented written briefs.)

The common carrier attitude, as previously expressed, is that, both by experience and by the very nature of their service, they are most entitled to the microwave frequencies of the "public" airwaves. Any space available, beyond that needed for public communication, they reason, could be leased out to private users by the common carriers. So the public would always have a "string" on the slices of the spectrum that were not in public use.

Private users, including the oil industry, disagree strongly. They contend that the public neither has access, nor would it ever have access, to the circuits set up for intra-company microwave operations, regardless of whether the system were owned by a common carrier or not. So the frequencies desired for such operations are not under franchise to the common carriers.

The petroleum industry, in presenting its own case to FCC, has asked for a generous slice of the spectrum.

The industry's effort was coordinated and paced by the Central Committee on Radio Facilities of the American Petroleum Institute. The testimony of W. M. Rust, regarding oil's present and projected microwave interest, was part of this effort.

Other spokesmen tackled the question of public interest in the industry's aims.

Two factors indicate that the industry's requirements can be met without crowding the airwaves, according to the witnesses:

- Oil company spokesmen pointed out that crowding, if any, is likely to take place in metropolitan areas; oil and gas companies depend on microwave in rural and remote locations, including offshore areas.
- The Radio Electrical Television Manufacturers Assn. introduced a study of potentials in microwave bands. The study indicates that there is sufficient spectrum space right now to accommodate large numbers of new systems. The experts estimate that in present bands allocated for private use, up to 1,500 different stations could be located in a given terminal area.

But even if the microwave range does get crowded, the industry feels it should have top priority for whatever space may be available.

Frank O. Prior, president of Standard Oil Co. (Ind.), said in a paper presented to FCC in his name:

"We want to be free to make use of this medium as conditions warrant. In order to do that, we must have, not just microwave, as such, but private-owner microwave . . . . The industry cannot afford to share its band of frequencies above 890 with the common carriers.

"Even more important," he said, "the industry can't be deprived of its private ownership and be forced to depend on the common carrier. Even in the best times of peace, the facilities of a common carrier are subject to interruption of transmission. A single strike at a strategic point could well shut the system down. For the petroleum industry, this would be deadly."

The public, several witnesses testified, has a big stake in the oil industry's use of microwave as a reliable, economic, versatile tool.

Microwave beams are focused into a narrow band and rifled from one relay station to another. In this respect, they are unlike lower-frequency radio beams, which are broadcast to the four winds. Microwave, therefore, causes little or no interference with neighboring channels. It also keeps the

operating company's messages and signals private.

The microwave beam, furthermore, while it serves as an invisible "wire" divided into finely cut channels, may accommodate new channels without the expensive stringing of new wire that's necessary with a true wireline set-up.

Moreover, the microwave "wires" aren't susceptible to storm damage. And right-of-way acquisition and maintenance doesn't include a myriad of poles: Microwave stations are located 50 mi. or more apart.

The channels themselves may be used for voice communications, over a pipeline route, for example, or between company headquarters and producing areas. And some of the channels may be subdivided into tone channels for telemetering and remote control operations.

J. Howard Marshall, vice-president and director of Signal Oil & Gas Co., and Henry Cortes, director and vice-president of Magnolia Petroleum Co., were among the witnesses who stressed the importance to the public of efficient, reliable petroleum supplies—and the part played by microwave in achieving those goals.

Cortes said his company is now planning tentatively to put microwave to use for telemetering and remote control of production platforms, enabling the company to operate under weather conditions now requiring shutdowns. He said the company is even considering a microwave system for drilling platforms.

Marshall noted that the reliability and efficiency of microwave in peacetime would be more of a public advantage in the event of an emergency.

Given continued rights to microwave radio, the petroleum industry can develop the medium for even more uses than now exist, two other witnesses testified.

William Morris, vice-president of Sinclair Oil Corp., described the possibilities of a system in which microwave would be used for central-office gathering of information from all segments of a company's operations—so that all efforts from producing to marketing could be coordinated rapidly.

Edward W. Messenger, communications engineer for Union Oil Co. of California, told FCC that the possibilities of closed-circuit TV, via microwave transmission, have hardly been tapped by the oil industry.

Offshore operators have already used cable systems for a peek at underwater activities, he said, but microwave could be used for simultaneous transmission to other points, and for drilling and production operations ashore.

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What's New / IN TRANSPORTATION

Four Corners Pipe Line Co. is awarding construction contracts for its projected pipeline to Los Angeles. Three companies have received contracts to build 485 mi. of the estimated 600-mi., $50-million line.

The contracts went to A. P. Vaughn Construction Co., Ft. Worth, Tex.; R. H. Fulton Construction Co., Lubbock, Tex., and Potashnick Construction Co., Cape Girardeau, Mo.

Contracts for the remaining work will be let soon, as will a contract for construction of a major crossing at the Colorado River.

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Canada has just put into effect a series of regulations designed to prevent oil pollution of its inland and coastal waterways by ships carrying oil as either cargo or fuel.

A $500 fine, or imprisonment up to six months, has been ordered for violators. A violation is defined as any oil or oily mixture that fouls the surface of the water (with fouling defined as a mixture containing 100 parts or more of oil in a million parts of the mixture). Exempt will be bilge discharges containing only lubricating oil, emergency discharges, or accidental or unavoidable leakage.

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Mountain Fuel Supply Co., of Salt Lake City, wants to extend its transmission lines 34 mi. north of Ogden, Utah, into the Cache Valley.

The company has asked the Utah Public Service Commission to approve the $2¼-million project. New 12-in. facilities would be built to Logan and Brigham City before the year ends.

•

Pioneer Natural Gas Co. is about to build a $4.5-million, 70-mi. pipeline to tap shut-in gas wells in Val Verde, Sutton, and Schelicher counties, Tex. The project was just authorized by the Federal Power Commission.

Permian Basin Pipeline Co., a subsidiary of Northern Natural Gas Co., has contracted to buy up to 200-million cu. ft. of gas per day from the projected Pioneer line. Initial deliveries, slated for early fall, are expected to be at a rate of 60- to 70-million cu. ft. per day.

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The world's longest coal pipeline has finally started operating.

Last week, Cleveland Electric Illuminating Co. announced it had received its first pipeline shipment from Pittsburgh Consolidation Coal Co. The coal, mined near Cadiz, Ohio, traveled 108 mi. to Cleveland Electric's Eastlake (Ohio) plant, 22 mi. east of Cleveland.

The line was first opened last February. But it became clogged before the coal could complete the trip (PW—May3'57,p54).

•

Overseas Tankship (U.K.) Ltd., a Caltex subsidiary, has ordered two 65,000-ton tankers, to be built in Japan, according to Hitachi Shipbuilding & Engineering Co. Hitachi says contract terms amount to $218.50 per ton in U.S. dollars. Delivery is set for the second half of 1961.

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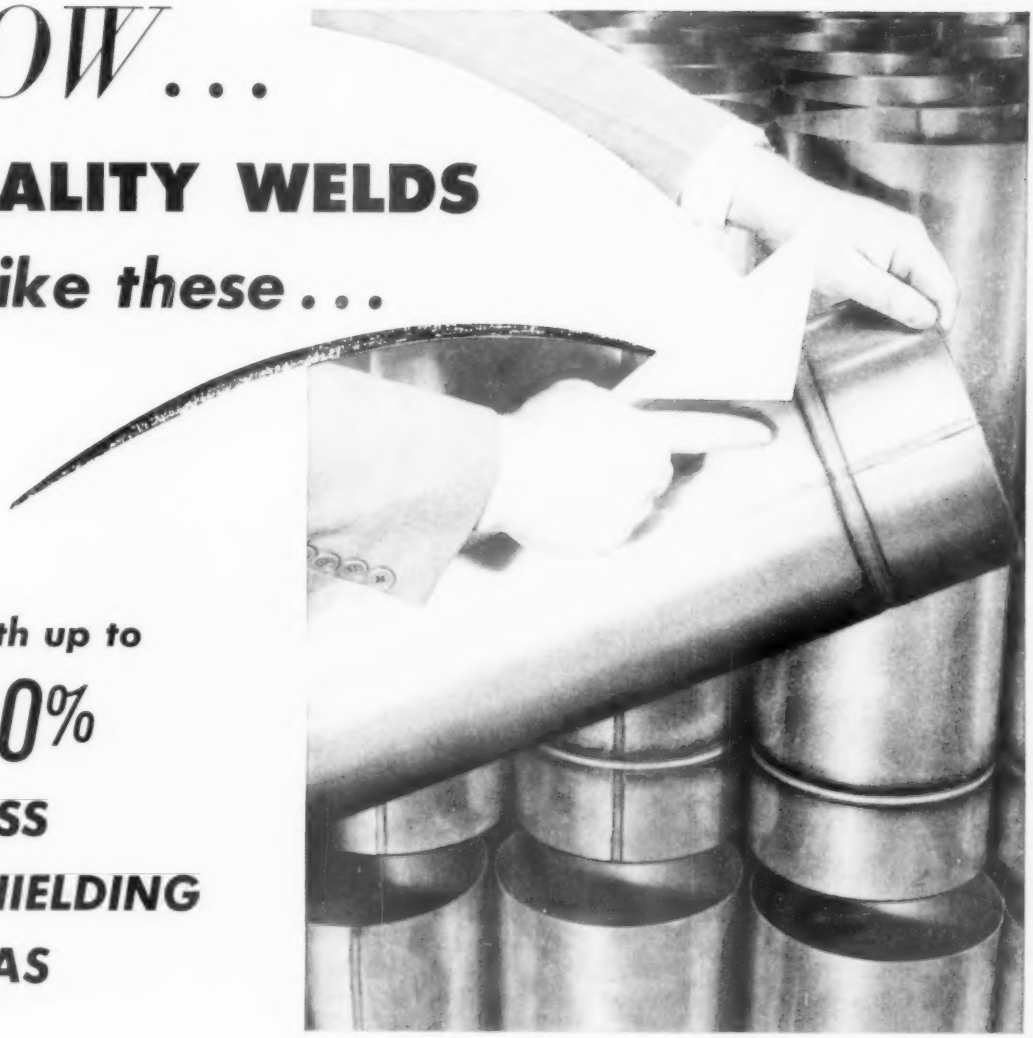

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Shown here with his newest brand, Atlantic IMPERIAL® Gasoline, is Atlantic Dealer Robert Cole, of Atlantic City, N. J., who won highest honors in the annual "Retailer of the Year" competition sponsored by Brand Names Foundation, Inc. He received his special award at a dinner at the Waldorf-Astoria in New York City. Two other Atlantic dealers, shown at the right below, finished among the first five service station winners.

IT TAKES A MAN AND A BRAND

A top brand of products and topnotch service is the winning combination in the service station business.

With such a combination, everybody wins. The motorist who drives into the service station gets the high-quality products and interested care he needs to keep his car on the go. The man at the pump builds a business that contributes to the progress and welfare of the community.

The Atlantic Refining Company is proud that Atlantic dealers have been named service station "Retailer of the Year" *three times* . . . that *three of this year's five winners* are Atlantic dealers . . . that since 1952, in competition with thousands of service station dealers in all parts of the nation, Atlantic dealers have won *10 of the 25* Brand Names Foundation awards.

These achievements are the direct result of the teamwork between Atlantic and its dealers, working together to give the motoring public high-quality products and topnotch service at the right price.

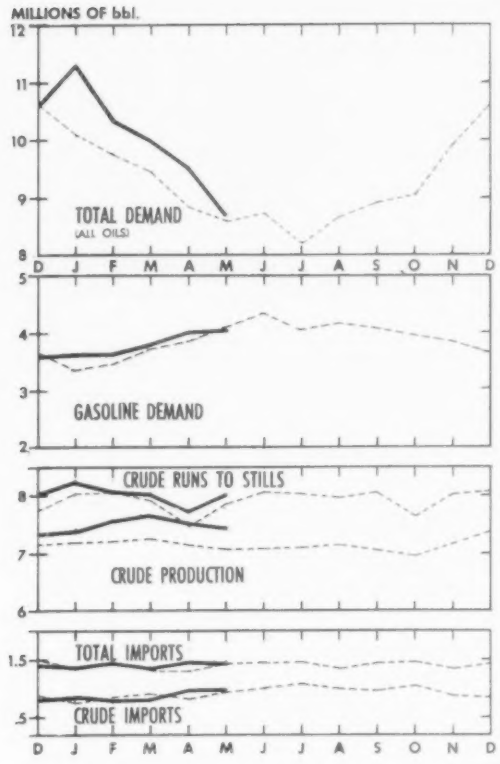
Atlantic Dealers Kenneth Mohr (left), of East Greenville, Pa., and Harold Smith, of Ithaca, N. Y., who won Certificates of Distinction in this year's Brand Names competition.

Atlantic Imperial®, designed especially for today's—and tomorrow's—most powerful engines, is now featured with famous Atlantic Gasoline throughout our marketing area.

THE ATLANTIC REFINING COMPANY Incorporated 1870 • Producer, Manufacturer and Marketer of Quality Petroleum Products

PETROLEUM WEEK'S

Fingertip Figures



TOTAL DEMAND
Latest 4-week average 8.695
Year ago 8.356

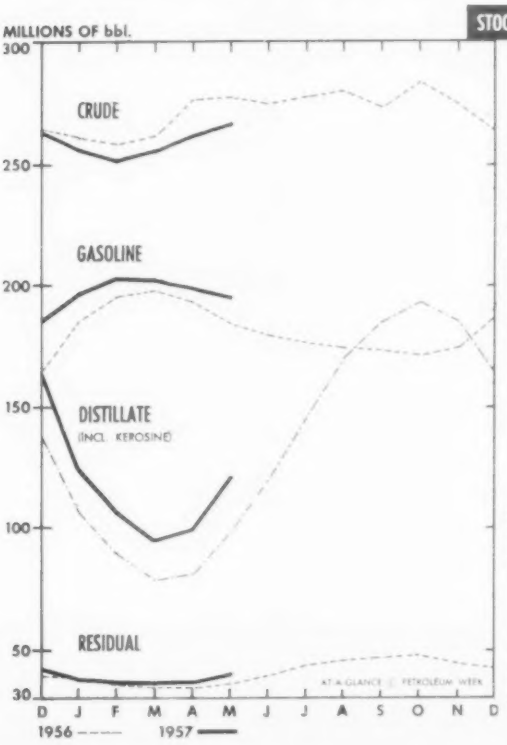
GASOLINE DEMAND
Latest 4-week average 4.171
Year ago 3.989

RUNS TO STILLS
Latest week 8.080
Previous week 8.132
Year ago 8.029

CRUDE PRODUCTION
Latest week 7.338
Previous week 7.418
Year ago 6.998

TOTAL IMPORTS
Latest week 1.483
Previous week 1.592
Year ago 1.442

CRUDE IMPORTS
Latest week 1.045
Previous week 1.217
Year ago 1.122



CRUDE STOCKS
Week-ended 6-1 269.1
Previous week 265.5
Year ago 275.7

GASOLINE
Latest week 193.6
Previous week 195.3
Year ago 184.5

DISTILLATES
Latest week 128.1
Previous week 121.9
Year ago 103.5

RESIDUAL
Latest week 41.2
Previous week 40.1
Year ago 36.7

The industry this week was in the midst of one of its perennial efforts to "even-up" a serious supply and demand imbalance. And like similar efforts in previous years, it comes almost too late.

Supply and demand statistics since the first of the year have indicated that some downward adjustments in operating rates should be made.

Demand, particularly domestic demand, has been below expectations. And new supply, both domestic production and imports, have been higher than expected.

The result is a current high level of inventories.

Unfortunately the efforts to "even-up" can create new imbalances because such efforts are not made evenly. Refinery "cut-backs" were made at a time when the total supply of domestic and imported crude is relatively high.

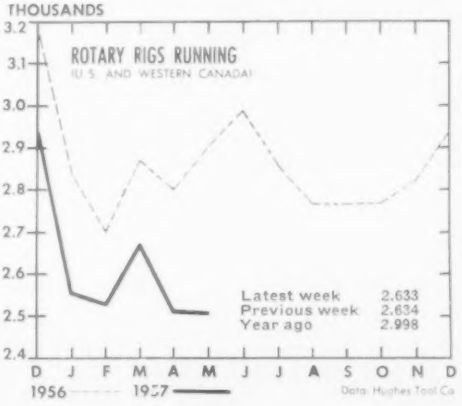
And too, the cutbacks were made when seven refineries were closed by strikes.

So far, the cutbacks and strikes affect nearly 400,000 b/d of refining capacity. Such a drop in runs did not show up in this week's API figures, but undoubtedly will next week, unless some refiners suddenly boost runs.

And while the lower refinery runs will improve the product inventory position, crude oil stocks—already rising fast—will move up much faster.

Already, the pressure is on domestic producers to make sharp cutbacks in output for next month (page 15). The big crude buyers, though, have made no suggestions that crude imports be cut.

The industry would be better off, if integrated companies had indicated a month ago that they would cut back. June production and import rates could have been properly adjusted, and the threat of purchaser proration would have been removed.



Latest week 2.633
Previous week 2.634
Year ago 2.998

The Market Trend

LP-Gas: Heavy Oversupply Cuts Prices

Propane prices dipped 0.5¢ a gal. in many areas of the nation last week. The net price for Group 3 shipments, after several suppliers increased their discounts, was 3.5¢ a gal.

Already this year, Mid-Continent propane has fallen 30% in value. Further declines appear almost certain. This swing compares with a 50% drop, from 4¢ to 2¢, in 1955, and a 20% fall, from 5¢ to 4¢, in 1956. And, some producers say they are convinced that sub rosa sales were taking place as low as 2¢ and 2.5¢, Group 3.

The troubles in LP-gas markets began last winter, when the weather was about 10% warmer than normal. Also, volatiles were among the few petroleum products which did not participate in the oil-for-Europe exports. The result was a fairly large carryover this spring in underground storage. Now, inventories below ground appear to be building at a rate of about 500,000 bbl. a week.

Apparently, propane markets are slipping back to the extreme price swings of the late 1940s and early 1950s. It wasn't too many years ago when propane prices often fell to 1¢, Group 3, in the summer. Sometimes the product was flared. Sellers in distress occasionally gave the product away if the buyer would take it off the premises. The hope was that the recent build-up in underground storage would level off these seasonal gyrations.

But even this enormous build-up can't halt price declines in the summer—if everybody wants to move propane. Texas, New Mexico, and Louisiana have a total of more than 20-million bbl. of underground storage; already this season these cavities are more than 50% loaded.

In Europe—A Surplus:

You may not believe this, but Europe has a fuel oil surplus. It will probably last all summer.

Italian refiners are longest on product, but there's more than enough supply in northern Europe, too.

The Suez crisis delayed many conversions from coal to oil in Europe. Coal output, too, has been much higher than expected.

Tight Spot In the Middle East:

Paradoxically, the one area in the world that was expected to be long on fuel oil now is on the short side—the Persian Gulf. Japanese demands for fuel oil (as long as the U. S. West Coast is short) have been extremely heavy.

This week a Persian Gulf refiner turned down a bid for a year's supply of heavy oil to be shipped to Japan. The U. S. government probably will move 24 cargoes of bunker oil from the Persian Gulf to Hawaii and California in the next six months.

No. 2 Fuel—Lots of Sellers:

No. 2 fuel prices slipped 0.5¢ a gal. at the Gulf, and sellers in the Caribbean followed suit. At the Gulf, there were about eight cargoes of spot material looking for buyers. Sellers were willing to part with No. 2 at West Memphis or Helena for "below 9¢," or lay it down in Chicago for about 9.75¢. At Detroit, the sale of 500,000 bbl. of No. 2 for export to Canada was reported at "below 10¢."

The Market Place

AROUND THE WORLD

Prices compiled for PETROLEUM WEEK by Platt's OILGRAM Price Service and National Petroleum News, McGraw-Hill Publications

All Prices of June 10

Bold face type indicates changes from previous week

KEY PRICES—REFINED PRODUCTS

(¢ per gal. except dollars per bbl. where $ is shown)

Western Hemisphere

U.S. Gulf Coast, Cargoes
- Gasoline, 98 oct prem. 13.5-14.375
- Gasoline, 92 oct reg. 11.5-12.625
- **Kerosine 9.625↓-11**
- **Heating oil, No. 2 9.5↓-10.5**
- **Gas oil, 48-52 d.i. 9.75↓-10.625**
- Fuel oil, bunker "C" $2.75-3.15

Caribbean, cargoes
- Avgas, Grade 100-130 17.5
- Gasoline, 93 oct research prem. 11.75
- Gasoline, 87 oct research reg. 10.875
- Gasoline, 79 oct research 10.125
- Gasoline, 70-72 oct motor method 9.75
- **Kerosine 9.625↓**
- **Heating oil, No. 2 9.5↓**
- **Gas oil, 48-52 d.i. 9.75↓**
- Fuel oil, bunker "C" $2.55

New York Harbor, barges
- Kerosine 11.75-12.25
- Heating oil, No. 2 11.15-11.65
- Fuel oil, No. 6 $3.10

Okla-Group 3, northern, shpt, bulk
- **Gasoline, 89 oct reg 12.25↓-12.75**
- Kerosine 10.375-11.125
- **Heating oil, No. 2 9.125↓-10.5**
- Fuel oil, No. 6 $2.35-2.60

Chicago, bulk
- Gasoline, 91 oct reg. 13-13.5
- **Heating oil, No. 2 10↓-10.65**
- **Fuel oil, No. 6 high sulfur 8.6-8.7↓**

Los Angeles, rack
- Gasoline, 84 oct reg. 13.6
- Diesel fuel, PS 200 10-11.25
- Light fuel, PS 300 $3.40-3.65
- Heavy fuel, PS 400 $2.85-3.05

Natural Gasoline, Grade 26-70
- FOB Group 3 4
- FOB Breckenridge, Tex. 3.5

LP-Gas
- **Propane, Oklahoma (Group 3) 3.5↓-5**

Penna Lubes
- Bright stock, 25 p. t. 27
- 200 vis. neutral, 25 p.t. 25

Mid-Continent Lubes, Tulsa basis
- Bright stock, solvent, 95 v.i. 25.5-26.5
- Neutral, solvent, 200-210 vis. 21.25-22.25

Gulf Coast Lubes
- Bright stock, solvent, 95 v.i. 26.5
- Neutral, solvent, 200 vis. 23

†Effective June 7.

Eastern Hemisphere

Singapore (Pulau Bukom), cargoes
- Avgas, grade 100/130 18.875
- Gasoline, 79 oct. research 10.75
- Kerosine 11
- Gas oil, 48 d.i. minimum 10.875

(2¢ differential per deg. of grav. applies except as noted)

Western Hemisphere

United States (at the well)
- Mid-Continent, 36.0-36.9 3.07
- North Dakota, 36.0-36.9 3.07
- Texas:
  - Gulf Coast, low cold test, 26.0-26.9 3.50
  - Gulf Coast, upper and lower, 26.0-26.9 3.22
  - West Texas, sweet, 36.0-36.9 3.07
  - West Texas, N. M. inter., 36.0-36.9 3.00
  - West Texas, N. M., sour, 32.0-32.9 2.86
  - East Texas, flat 3.25
  - Mirando, 28.0-28.9 3.51
- Illinois Basin, flat 3.15
- Pennsylvania Grade, Bradford dist. flat 4.88
- California, Signal Hill, 21.0-21.9 2.93†
- North Louisiana-Arkansas, 36.0-36.9 3.20
- Wyoming sweet, 36.0-36.9 3.00
- Wyoming sour, 32.0-32.9 2.71

Canada (flat prices, at the well)
- Acheson-Stony Plain (Alta.) 2.72
- Leduc-Woodbend (Alta.) 2.78
- Redwater (Alta.) 2.67
- Daly (Man.) 2.52
- Smiley (Sask.) 2.44

Venezuela (Cargoes, FOB lifting port designated)
- Cumarebo, 48.0-48.9, Tucupido 3.75
- San Joaquin, 40.0-40.9, Puerto la Cruz 3.37
- Oficina, 35.0-35.9, Puerto la Cruz 3.05
- Tia Juana, Medium, 26.0-26.9, Amuay 2.55
- Bachaquero, flat, Amuay, Las Piedras 2.23
- Tarra, 38.0-38.9, San Lorenzo 3.08
- Lagunillas Heavy, flat, Amuay 2.38
- Cardon 2.20

†Differential per deg. of grav. varies.

Eastern Hemisphere

Middle East, Persian Gulf (Cargoes, FOB lifting port)
- **Arabia, 34.0-34.9, Ras Tanura 1.93-2.10↑**
- **Safaniya, 27.0-27.9, Ras Tanura 1.68-1.79↑**
- Iran, 34.0-34.9, Bandar Mashur 1.91-2.04
- Iran, 34.0-34.9, Abadan 1.86-1.99
- Iraq, 35.0-35.9, Fao 1.85-1.98
- **Kuwait, 31.0-31.9, Mina-al-Ahmadi 1.85↑**
- Qatar, 41.0-41.9, Umm Said 2.10-2.25

Middle East, Eastern Mediterranean
- Arabian, 36.0-36.9, Sidon 2.69
- Iraq, 36.0-36.9, Tripoli, Banias 2.69

Far East, Cargoes, FOB Lutong, Sarawak
- Seria Light, 37-38 2.60

KEY TANKER RATES

(Last paid, per long ton, single voyage)

- U.S. Gulf-N. Y., clean (USMC —20%) $2.28
- U.S. Gulf-N. Y., dirty (USMC —30%) $2.00
- **NWI-USNH, dirty (USMC —35°o) $1.76↑**
- NWI-UK Cont., dirty (Scale —10%) 29.3*
- Persian Gulf-UK Cont., dirty (**Scale +217%) $225/16*
- **Persian Gulf-USNH, dirty (USMC —35°o) $8.26↓**

**Sterling* ***Via Cape of Good Hope*

G. D. Almen, Jr.

R. A. Wright

G. D. ALMEN, JR., vice-president of Sinclair Oil & Gas Co., has been named manager of the Houston division. R. A. WRIGHT succeeds him as vice-president and manager of the offshore division, in New Orleans. Wright was formerly assistant to the president assigned to the offshore division. Almen is replacing J. B. Kennedy, vice-president and division manager, who is transferring to Tulsa as executive vice-president for operations, a newly created post. Howard J. Bernard, intermediate petroleum engineer at Odessa, has been transferred to Hobbs, N. M., as senior petroleum engineer. Joseph E. Vallery, senior landman for Sinclair in Midland, Tex., is transferring to Houston in a similar capacity. Joe N. Gifford, junior geologist at Wichita, Kan., has been promoted to intermediate geologist of the offshore division, at New Orleans.

A. F. BARRETT, Billings (Mont.) manager of Rocky Mountain operations for Mobil Producing Co., was elected 1957-58 president of the Rocky Mountain Oil & Gas Assn. at its recent annual meeting, in Denver. He is succeeding William H. Curry, whose term expires on June 30. Other newly elected RMOGA officers are: Robert E. McMillen, Sidney (Neb.) district manager of Ohio Oil Co., vice-president for Nebraska; Warren J. Hancock, partner in Mule Creek Oil Co., Billings, vice-president for Montana; F. H. Gower, Denver independent, vice-president for Colorado. H. A. True, Jr., and Bruce Anderson have been reelected vice-president and treasurer, respectively. True is president of True Oil Co. and True Drilling Co.; Anderson is an independent operator. Both men are based in Casper, Wyo.

NORMAN T. ROBEY is the new assistant manager of the Whiting (Ind.) refinery of Standard Oil Co. (Ind.). He succeeds C. H. Daugherty, who has retired. Robey is succeeded by Delmer G. Debo as assistant manager of the Casper (Wyo.) refinery. In the planning division of the company's general office in Chicago, Robert S. McDaniel returns from a special assignment to his former position as supervisor of light oils planning. F. Curtis Smith becomes supervisor of capital expenditures, miscellaneous contracts planning. In the operations division Richard H. Dust, Jr., has been named assistant cost supervisor. Marion E. Watts, with Indiana for 24 years, has been named accounting manager for the northern region, in Milwaukee. Lewis G. Goodlander succeeds him as senior assistant regional accounting manager. Goodlander is replaced in Chicago by Norman H. Crozier as assistant accounting manager of the central region. Gerald Rose, a patent searcher for the company since 1956, has been appointed a patent solicitor in the Chicago development and patent department.

CHARLES E. SIMONS, Dallas, executive vice-president of the Texas Mid-Continent Oil & Gas Assn., has been appointed to the Trade & Professional Assn. Committee of the U. S. Chamber of Commerce.

JOHN AIKEN is the new executive secretary of the National Oil Jobbers Council. Aiken, formerly marketing administrator of the marketing distribution department of the U. S. Chamber of Commerce, succeeds Harry Jones, who recently resigned.

D. D. WRIGHT will superintend production operations of Royalite Oil Co., Ltd. He joined the company in 1942, and has had extensive experience in various phases of petroleum production and engineering.

DOAK DRILLING CO. has been formed at Bristow, Okla., by Oras A. Shaw, Tulsa, and Howard J. Doak and William M. Hughes, Bristow.

M. A. Mundy

E. L. Walton

J. B. Saunders

T. A. Van Griethuysen

CORRECTION: In last week's issue, we erroneously identified pictures of Mahlon A. Mundy and E. L. Walton, of D & D Drilling Co., as J. B. Saunders, of Triangle Refineries and Kerr-McGee Oil Industries and T. A. van Griethuysen, of Continental Oil Co. of Venezuela, respectively. The pictures that appear above are correctly identified. We regret any embarrassment that the incorrect identification may have caused.

QUENTIN W. REGESTEIN has been appointed assistant manager of Socony Mobil Oil Co.'s Prestate central region, with headquarters in Chicago. He has been administrative assistant to the general manager of domestic marketing, in New York, since December, 1956.

Q. W. Regestein

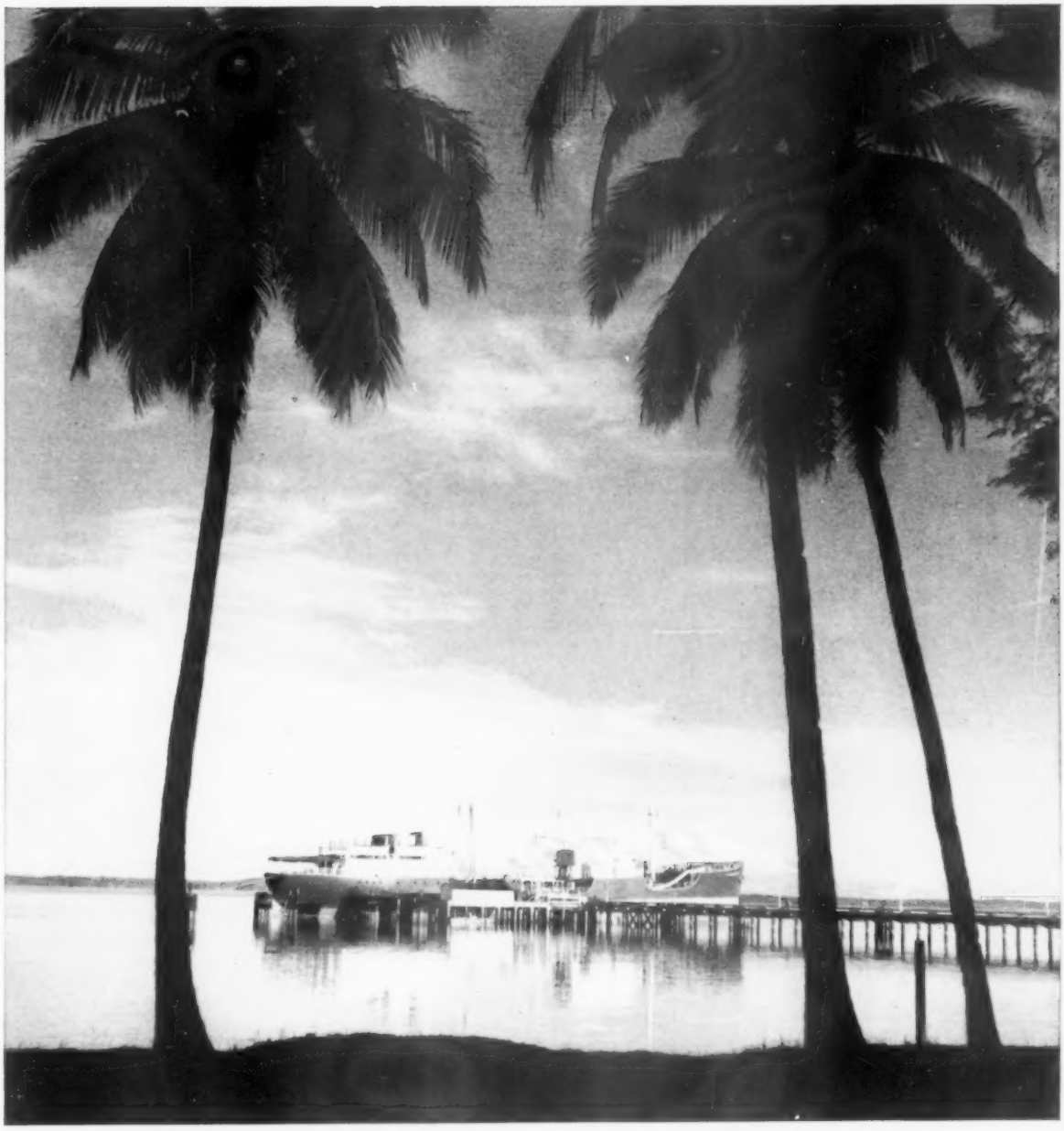
T. L. McWilliams

T. L. McWILLIAMS becomes assistant superintendent of Texas Gas Transmission Corp.'s compressor station department, Owensboro, Ky. He had been a compressor station division superintendent in Memphis since August, 1950. McWilliams succeeds J. B. Eaton, Jr., recently appointed superintendent.

WAYNE L. McCANN, of McCann-Rogers Consultants, has been named chairman of the Louisiana-Arkansas section of the American Institute of Mining, Metallurgical & Petroleum Engineers. Other officers elected are: Don Boling, National Tank Co., first vice-chairman; M. F. Farrell, Gulf Refining Co., second vice-chairman; and Paul S. Clinkenbeard, Dowell, Inc., third vice-chairman. Dr. Glen L. Corrigan has been named a director for a one-year term. He is a professor in the department of petroleum engineering at Louisiana Tech. Jim Russell, Arkansas Fuel Oil Corp., and Robert F. Cashen, First National Bank, have been named directors for two-year terms.

R. L. CONKLING and EARLE HAPKE have joined the geological department of Phillips Petroleum Co., Oklahoma City. Conkling, who transfers from Bartlesville, will be in the geological exploration section. Hapke is moving from Midland, Tex., to the geological development section.

GULF OIL CORP., has reorganized four zones into districts in the Ft. Worth (Tex.) production division, and has named four men to manage the new offices. The managers are J. D. Moody, formerly assistant division exploration manager, district 5, Midland; K. E. Rotegard, district 6, Amarillo; J. A. Hord, former division production geologist, district 7, Wichita Falls; and Eugene Hosford, former assistant division production manager, district 8, Roswell, N. M. Other new appointments: Tom Q. Williams replaces Rotegard as supervisor of the budget, statistics, and organization department, Ft. Worth. R. C. Herron transfers to Midland as assistant district exploration manager. He will



"Change is a law of life. But what is disturbing is evidence now and then of a drift backward to the old notion that agreements are merely scraps of paper. The world cannot be organized for its own good on any such foundation of irresponsibility. We must be able to rely upon each other's word. There is no other principle on which people and nations can work together for progress and their mutual benefits."

— *Eugene Holman, Chairman of the Board, Standard Oil Company (New Jersey)*

ESSO 75 YEARS

producing energy for an abundant life

STANDARD OIL COMPANY (NEW JERSEY)

AND AFFILIATED COMPANIES

be succeeded in Ft. Worth as division geophysicist by **L. V. Lombardi. G. R. Belt** replaces Lombardi as division geophysical interpretation supervisor. **L. E. Warren**, assistant district exploration manager at Midland, is transferring to a similar position in Amarillo. **H. L. Straughan, Jr.**, district geologist, is moving to Amarillo, and **R. E. Griffith** replaces him at Midland.

PAUL H. BRANDENSTEIN, former drilling superintendent for E. E. Moran, Inc., will manage the company's eastern division at Evansville, Ind. He succeeds **E. D. Harmon**, who has retired.

GERARD L. FAIRCHILD, a Denver consulting geologist, has been elected to the board of Inland Development Corp., exploration and development subsidiary of Empire Petroleum Co., Denver.

A. F. REED has been named assistant in sales matters to executives of both Lion Oil Co. and the Inorganic Chemicals Division of Monsanto Chemical Co., the parent. He was formerly Lion's director of sales. **J. H. Sheehan**, vice-president of Lion Oil, will assume full responsibility for the company's petroleum product sales.

HOOVER L. GIBSON has been appointed superintendent of compressor engineering for Texas Gas Transmission Corp., Owensboro, Ky. He was formerly Division III superintendent in the compressor station department.

R. C. SHARP, formerly vice-president and director of Drilling & Exploration Co. of Delaware, has joined Kellogg Overseas Corp. as vice-president. The new organization, a wholly-owned subsidiary of K. L. Kellogg & Sons, drilling contractors, will maintain offices in Compton, Calif.

R. C. Sharp D. G. Morgan

D. GLENN MORGAN has been named consulting technologist of the Western Petroleum Refiners Assn., in Tulsa. He had retired recently as director of research and development for D-X Sunray Oil Co.

A. F. CHILDERS, JR., former president of Toklan Oil Corp., has been named vice-president of Gulf Coast Leaseholds, Inc., Houston. Before joining Toklan, Childers was associated with the Houston consulting firm of Cecil Hagen & Associates.

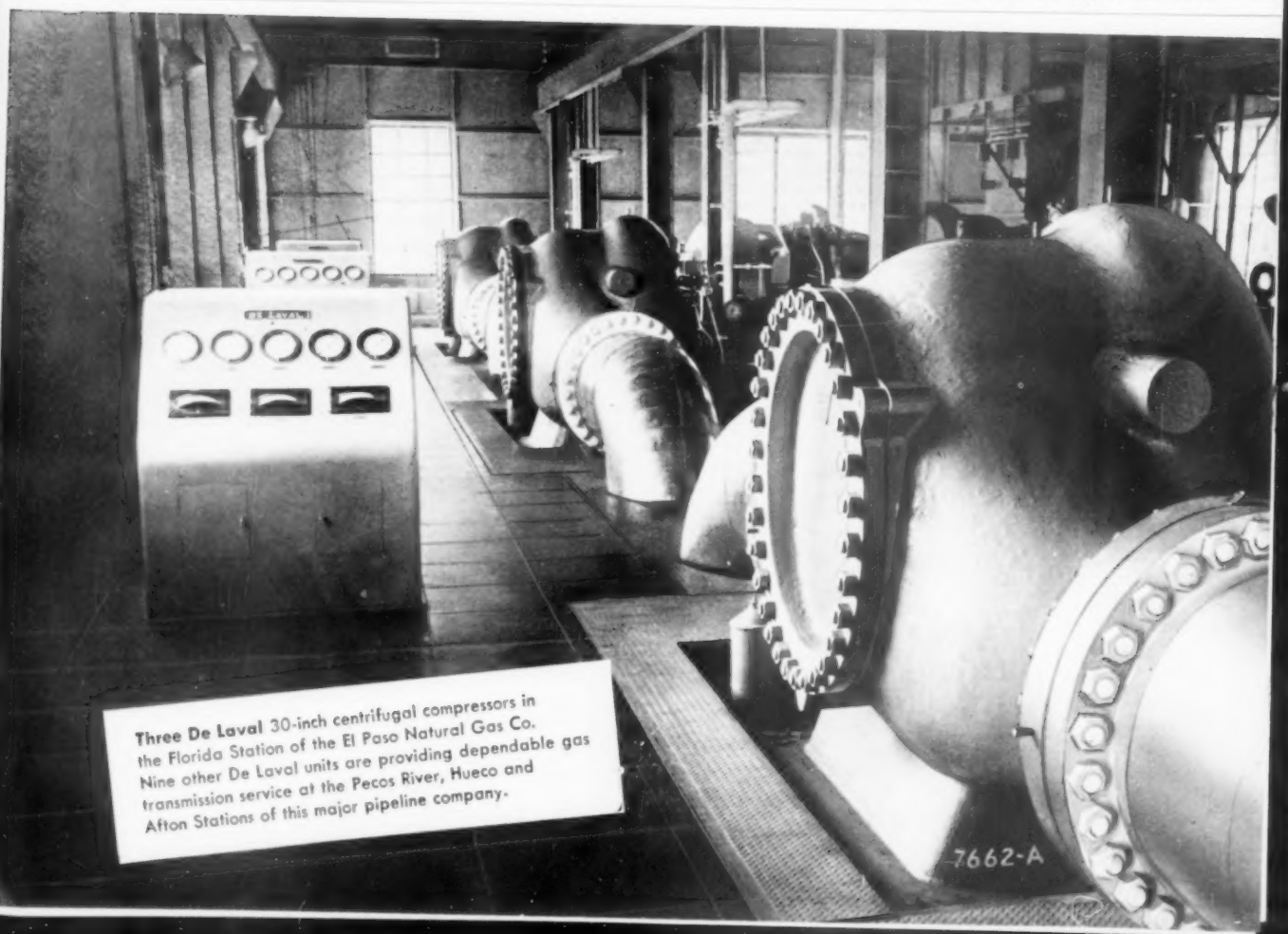
GROVER E. LEDLIE, JR. has been made administrative assistant to the president of Falcon Seaboard Oil Co., in Tulsa.

A. B. BROWN has been elected president of Richmond Exploration Co., Standard Oil Co. of California producing and exploration subsidiary in Venezuela. He succeeds **C. R. Cabrera**, who was recently appointed to Stancal's executive staff. For the past two years, Brown has been serving in Indonesia as managing director of Stancal's affiliate, Caltex Pacific Petroleum Co. His new headquarters will be in Caracas.

THE MISSISSIPPI LANDMEN'S ASSN. has elected its 1957-58 officers and executive committee. The officers are **W. A. Long, Jr.**, Honolulu Oil Corp., president; **C. C. Braddock**, Carter Oil Co., vice-president; **D. O. Bear**, Seaboard Oil Co., secretary-treasurer. Executive committee members are **L. D. Buchanan**, Lion Oil Co.; **Fred Forward**, Phillips Petroleum Co.; **Michael McKay**, Magnolia Petroleum Co.; **B. W. Haywood**, Gulf Oil Corp.; and **L. C. Farrington**, Ohio Oil Co.

C. J. LONG, Pan American Petroleum Corp., has been elected 1957-58 president of the Ft. Worth Geophysical Society, succeeding **A. E. McKay**, Continental Geophysical Co. Other new officers are **O. A. Strange**, Pure Oil Co., vice-president; and **D. T. McCreary**, The Texas Co., secretary-treasurer.

HOWARD P. KULP will manage the Marcus Hook (Pa.) refinery office of Sun Oil Co. Since 1955, he has been assistant office manager at the refinery. **Arthur B. Kent** has been



Three De Laval 30-inch centrifugal compressors in the Florida Station of the El Paso Natural Gas Co. Nine other De Laval units are providing dependable gas transmission service at the Pecos River, Hueco and Afton Stations of this major pipeline company.

named chief in charge of the refinery laboratory, succeeding **George E. Reese**, who has retired. Since January, 1957, Kent has been special assistant to **Walter C. Huffman**, superintendent of refining. **Charles C. Martin**, crude oil coordinator at the refinery, has been awarded a 1957 Sloan Fellowship for a year's executive development training at Massachusetts Institute of Technology. The course is designed to provide broad, top-level background in business leadership.

HINES H. BAKER is a new vice president of Standard Oil Co. (N. J.), and a member of the executive committee. Baker, formerly president and a director of Humble Oil & Refining Co., a Jersey affiliate, was also named a director of Jersey Standard.

EARL G. ELLERBRAKE is on leave of absence for a year from Sohio Pipe Line Co., to accept an assignment as industrial specialist in petroleum transportation, the Office of Oil & Gas, U. S. Interior Dept., Washington, D. C. Since 1953, he has been group supervisor of planning in the engineering section of Sohio's transportation department, in Cleveland.

PAUL A. RAHE has transferred to Denver as landman in the production division of Gulf Oil Corp. He was formerly division landman in Tulsa.

ROBERT V. PHIPPS has joined the geological department of Atlantic Refining Co., in Midland, Tex. He was formerly associated with Gulf Oil Corp. and Texas Crude Oil Co., in Ft. Worth.

E. B. BREWSTER has been promoted to the newly created position of assistant division geologist at Oklahoma City, for Continental Oil Co. He has been with Conoco since 1953.

R. P. Cocke R. G. Follis

RICHARD P. COCKE has been named a vice-president, and **R. G. FOLLIS** board chairman, of Trans-Arabian Pipe Line Co. Cocke, in New York headquarters, will continue to serve as secretary and treasurer, but **O. T. Swanson** replaces him as comptroller. Follis, board chairman of Standard Oil Co. of California, San Francisco, succeeds **Clyde A. Swigart**, who has retired. **John Noble**, Tapline president, has been named chief executive officer, with headquarters in Beirut, Lebanon. Swanson, formerly Tapline's assistant comptroller and assistant treasurer, also will be based in Beirut.

ROBERT E. AIKMAN, Amarillo, Tex., has become an independent in the drilling and leasing field. He resigned recently as vice-president of Petroleum Exploration, Inc.

H. C. SLIDER, associate professor in the petroleum engineering division of the College of Engineering at Ohio State University, has been retained by Humble Oil & Refining Co. in Houston. He will study its reservoir engineering school and make recommendations for improving the curriculum, manual, methods, and other matters. Slider was formerly head of the reservoir engineering section of Shell Oil Co.'s Illinois division, in Centralia.

WALTER E. SCOTT has been promoted to sales supervisor of Tulsinia Gas Products Co., Tulsa marketer of LP-gas. He was formerly senior sales engineer. The company has established two new district sales offices, in Williamsburg, Va., and Salt Lake City, Utah, in charge of **R. P. Erickson** and **A. N. Fusie**, respectively. Both men are transferring from former positions in the company's general offices, in Tulsa. **I. V. Jolly** moves from Tulsa to Houston as district sales representative.

E. L. WILSON, JR., has been named senior research chemical engineer in research and development division of Humble Oil & Refining Co.'s Baytown (Tex.) refinery. **Robert H. Walton** becomes senior mechanical engineer at the refinery.

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on the job at El Paso Natural Gas

De Laval centrifugal compressors offer many important engineering features. (1) They are designed to handle an increased ultimate flow, can be quickly converted to larger capacities by replacing the impeller, diaphragm and a few minor parts. (2) The high pressure shaft seal eliminates leakage, consumption of sealing oil is negligible. (3) There is only one moving part—the rotor—which has ample clearance. (4) Units are compact, require smaller foundations and smaller stations. (5) First costs and installation costs are low.

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Jackson 3-8851

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350 Park Square Bldg.
Hubbard 2-7160

Chicago 11 — W. F. Holbrook
520 North Michigan Avenue
Mohawk 4-5800

Cleveland 15 — J. E. MacArthur
1510 Hanna Bldg.
Superior 1-7000

Houston 25 — D. O. Hanson
724 Prudential Bldg.
Jackson 6-1281

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Gibson 7-5591

England, London E. C. 4 — Herbert Lagler
McGraw-Hill Co., Ltd.
95 Farringdon St.

DEPT/Service & Equipment Companies

JAMES W. BOZEMAN is the new executive vice-president of TUSCO Corp., formerly Tubular Service & Engineering Co., Houston. He had been president of Tuboscope Co., a TUSCO subsidiary, and will continue as board chairman of the subsidiary. He has been succeeded as president of Tuboscope by **B. H. Pickard.** In the new position, Bozeman will take active part in the management of TUSCO's oil field service companies, its building material division, and its aircraft division.

J. W. Bozeman

E. L. Miller

EUGENE L. MILLER has been elected president and general manager of Cooper-Bessemer Corp., Mt. Vernon, Ohio. At the age of 38, Miller is the youngest president in the history of the 124-year-old engine and compressor building firm. Miller was formerly assistant general manager.

HOUDRY PROCESS CORP. has made nine personnel changes in two of its divisions. In the Philadelphia process sales and engineering division **D. E. Womeldorph** and **F. R. Walser** become commercial development engineers in the sales department. In the division's engineering department, **Lee Friedman** becomes assistant supervisor, process design; **R. G. Craig** and **A. K. Logwinuk** senior process design engineers; and **Bent Busch-Peterson** associate process design engineer. In the technical service department, **W. J. Cross** is the new assistant supervisor. **N. M. Kapp** is commercial development section chief, and **R. E. Ashwill** is chief of the chemical engineering section, in the development department of Houdry's research division, in Linwood, Pa.

K. P. CUNNINGHAM has been named vice-president of the new Hillmac Division of American Coldset Corp. This new division is the result of the merger of two American Coldset subsidiaries, Hillmac Corp. of Midland, Tex., and ACC Coring Division, Denver, Colo. The merger places the parent company's diamond coring operations under one division, with headquarters in Midland. **G. G. Hiller** and **J. C. McNeal**, vice-presidents of Hillmac at Midland, will continue in similar capacities there.

GRAHAM W. AKER has been named sales engineer for the Wichita Falls (Tex.) district office of Welex Jet Services, Inc., oil well servicing company. He was formerly an R/A operator with Welex.

ANTHONY M. JOHNSON has been appointed product line sales manager, systems division, of Beckman Instruments, Inc., Anaheim (Calif.) manufacturer of data reduction systems. He was formerly southern regional sales manager for the company's scientific instruments division, in Washington, D. C.

G. P. BROCKMANN has been appointed chief engineer of Guy T. Martin & Co., Los Angeles engineering and construction firm. **W. E. Fryer** becomes project engineer for the company. Both men were formerly with Richfield Oil Corp., Brockmann as general engineer of the southern division production department; Fryer as a project engineer in Los Angeles.

B. J. RAMEY is the new general sales manager of Tube-Kote, Inc., Houston manufacturer of pipeline coatings. Other new appointments are **L. C. Edgar**, technical director; and **Barnard P. Goodman**, research director. Prior to the promotions, Ramey had been sales engineer and sales coordinator; Edgar had held various technical and research positions during nine years with the company; and Goodman was a research chemist.

B. J. Ramey

T. W. Krueger

T. W. KRUEGER will manage sales of Duff-Norton Co., Pittsburgh manufacturer of industrial jacks and hoists. He will be in charge of the Jack and Coffing Hoist Divisions. Krueger has been a sales manager of the company's Jack Division since January, 1957.

GENE JOHNSON has joined the product design staff of Enardo Mfg. Co., Tulsa manufacturer of oil field specialties. Johnson was formerly associated with the aircraft industry in California, specializing in fuel and oil systems.

RAY HARTZOG is the new Houston area sales engineer for Waukesha Sales & Service, Inc., distributor of oil field engines. He was formerly office manager of McGregor Carbon Forms Co., in the state of Washington.

SAM ARCHER has been appointed sales representative for Dewey Supply Co., Tulsa. Prior to the promotion, he was on the staff of the purchasing and pricing department.

ROBERT D. LANDIS, sales representative of Jones & Laughlin Supply Division, is transferring from Odessa to Alice, Tex.

WILLIAM H. WAGNER has been appointed advertising and public relations manager for Pacific Pumps, Inc., Huntington Park, Calif., one of the Dresser Industries. Wagner had serviced the Pacific Pumps account during his entire 12 years as account executive and director of merchandising for the McCarthy Co., Los Angeles. He will be assisted by **Richard T. Dyer**, who has been in sales research since joining Pacific four months ago.

W. H. Wagner

E. N. Cooley

EDWARD N. COOLEY has been appointed vice-president in charge of the petroleum industry equipment and thermal products divisions of Aleo Products, Inc. He formerly was director of administrative services. From New York headquarters, he will handle the petroleum equipment division, located in Houston, with a manufacturing plant at Beaumont, Tex. The division manufactures oil field and production equipment for southwestern markets. The thermal products division is located at Dunkirk, N. Y.

JOHN C. DAWSON transfers to Albany, N. Y., as petroleum sales representative of Goodyear Tire & Rubber Co. He was formerly a member of the company's Akron (Ohio) sales division.

J. K. ABELL, a 20-year man with Halliburton Oil Well Cementing Co., has been named manager of Halliburton Argentina, S. A., in Buenos Aires. He has been in charge of the company's Venezuelan operations since 1955.

S. S. JONES, JR., has joined the staff of Hydrocarbon Construction Co., Houston. For the past 20 years he has been in industrial construction work as a supervisor and executive, specializing in refinery and chemical plant building.

GEORGE A. BORNING has been named field representative at Odessa, Tex., for Oil Well Supply Division, U. S. Steel Corp. **Stuart J. Stein** will manage the Morgan City (La.) store for the company.

WALTER W. PERKINS, Los Angeles, is the exclusive agent in Southern California for Aleo Products, Inc., manufacturers of finned tube heat exchangers and other longitudinal finned tube products.

CARL G. HIGGINS has been assigned to the Worland (Wyo.) store as local manager for Jones & Laughlin Supply Division. He formerly was store manager in Newcastle, Wyo.

J. D. EPPERSON will be in charge of the newly opened Monahans (Tex.) branch of McCullough Tool Co. The new branch will supply wire line services to the area.

JOHN Q. WOODRUFF has been named manufacturer's agent for John Wood Co. in Utah, Montana, Nevada, Idaho, and western Wyoming. He will handle the company's automatic water heaters and Fluid Heat heating equipment for the heater and tank division.

NOMADS, Los Angeles chapter, played host to a group of foreign guests from South America and the Middle East at its recent May meeting. Guests attending the meeting are (seated, l. to r.), **William N. Thompson**, Drilling & Exploration Co., Turkey; **Ray A. Hancock**, chief engineer, Petro-Tech Service Co., Venezuela; **William Nichols**, manager, Los Angeles Coliseum (guest speaker); **Charles M. Looper**, manager, Ralph M. Parsons, India; and **Pete Marolf**, tool pusher, Iraq Petroleum Co., Persian Gulf; (standing, l. to r.), **J. H. Romijn**, senior tool pusher, Bataafsche Petroleum Maatschappij, The Hague, Holland; **Edward O. Hammer**, petroleum engineer, The Texas Co., Venezuela; **Galen L. Linder**, sales representative, National Supply Co., Venezuela; **Rhett Wilder, Jr.**, branch manager, Baker Transworld, Venezuela; **"Rosey" Hendershott**, drilling department, Caltex Pacific Oil Co., Indonesia; and **H. B. White**, drilling supervisor, Caltex Pacific Oil Co., Sumatra.

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Petroleum Engineer: Desires position with independent consultant or small company. 7 yrs. engineering and supervisory experience in drilling, production, workovers and gas processing. Presently employed Gulf Coast. Single, will relocate. PW—5141, Petroleum Week.

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Petroleum Geologist: M.S., 29, married, 4½ years major companies experience East and West Texas, surface and subsurface exploration, development coordination, and administrative. Desire relocation in Denver or Salt Lake City area. PW-5220, Petroleum Week.

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Let Your People Train Themselves

TAKE A SECOND LOOK at that picture on page 60. It holds the key to successful training in the oil industry: Incentive.

The picture shows a cross-section of Richfield employees at one of the company's highly successful public speaking courses. It is significant that there's no company pressure to attend. The employees are there because they themselves want to learn. This underscores one of the best chances oil management has ever had to make training take hold.

A SOCIAL PHENOMENON in America today is the intense and growing desire of people to improve themselves. Witness the great expansion of adult education in recent years. The do-it-yourself trend is another symptom. H. G. Mangelsdorf, chairman of Jersey Standard's Advisory Committee on Human Relations, analyzes it this way: "As the economic level rises, the necessities are becoming relatively less important. People are becoming more interested in an enlargement of their satisfactions."

What makes this blossoming interest in self-development so important? As the oil training man, supervisor, or executive knows only too well, people don't improve without a wish to improve. The finest instruction is wasted if the vital "incentive" element is lacking. As the personnel man often explains, "You can't 'train' anyone. You can merely provide the opportunity to learn."

THE GOOD PROGRESS some oil companies have already made—by sponsoring classes in letter writing, conference leadership, and other subjects, in addition to public speaking—is only a beginning. And course content is only the first step.

The real payout will come from an all-out effort to fan the existing employee interest to a hotter pitch. This could include promotion of the benefits of extra study, insistence on topflight instruction, and official recognition of employee progress. The result of such a program could be to make an entire company "training conscious." And the benefit in this would extend far beyond special courses.

It comes down to this: The oil company that spreads a real desire to learn among its people will practically eliminate its training problem. The employees will solve it themselves.

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SLURRY

is shutting off water where all other methods have failed!

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You now have available—with Visqueez service—the most effective method ever developed for eliminating water from a producing oil or gas well.

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1. *Visqueez slurry thins on contact with water,* allowing easier and deeper penetration into the water-bearing sections. (Other slurries *thicken* on contact with water.)
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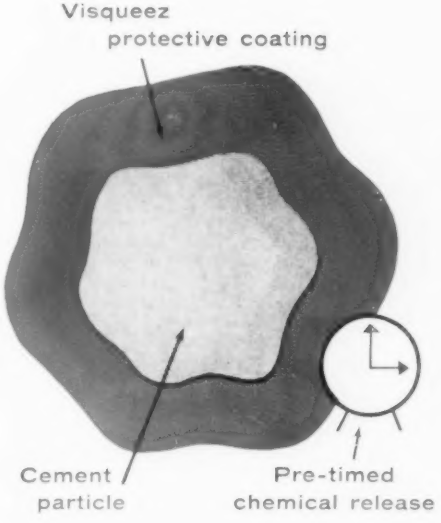
3. *Low fluid loss* minimizes the possibility of screen-out.
4. *Lower injection pressures* are possible and the usual final squeeze pressures are eliminated.
5. *Either common, slow, or quick-set* cements may be used.



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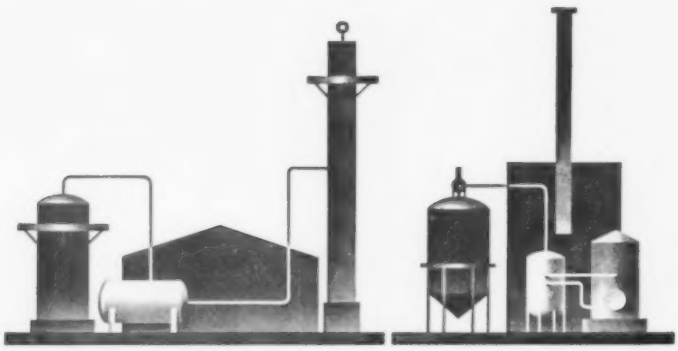
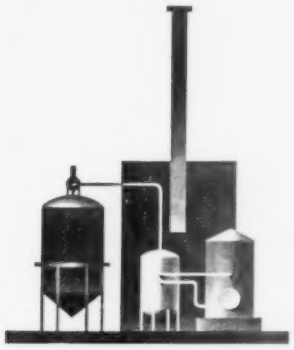


General Tire and Rubber Company

This integrated plant for the production of 25 million lbs/yr. of monomer and polymer was the first American plant based on SD's vinyl processes.



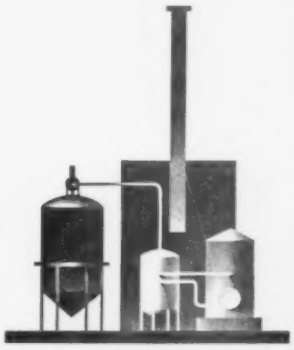
Borden Company

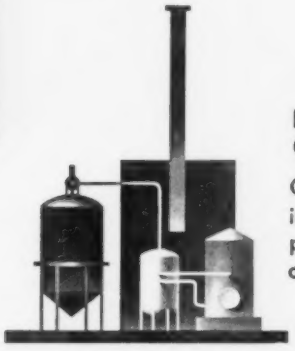
Located in Leominster, Mass., this plant was designed by SD and constructed by SD Plants, Inc.

PVC Monomer and Polymer Plants by SD

Thompson Chemical Company

This Hebronville, Mass. PVC plant was designed by SD and went on stream in 1956.



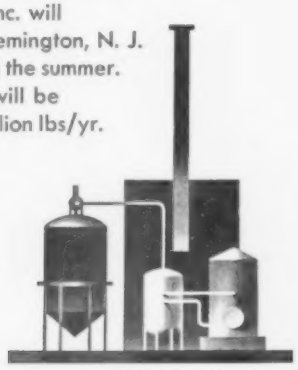


Eleonora Chemical Corporation

Completed by SD Plants, Inc. in 1956, this Passaic, N. J. plant is producing PVC at the rate of 10 million lbs/yr.

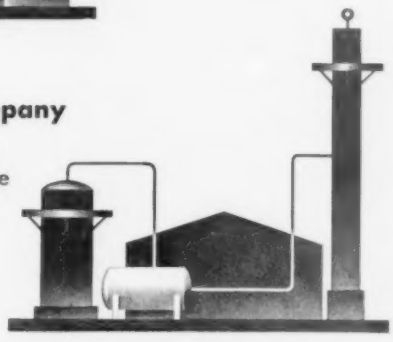
Cary Chemicals, Inc.

SD Plants, Inc. will finish this Flemington, N. J. plant during the summer. Production will be about 12 million lbs/yr.



Diamond Alkali Company

SD is now designing a 50 million lbs/yr. vinyl chloride monomer unit to be located at Diamond's Deer Park plant, near Houston, Texas.



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